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and
The AIRCRAFT ENGINEER

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The Outlook

Crisis Long-Deferred

ON the ninth of August Imperial Airways virtually ceased to accept new passenger bookings for their Empire services. That in itself forms a clear statement to the world at large that the greatest British air transport organisation has temporarily broken down.

Four major reasons are given for this lamentable decision—shortage of fleet, increase of mail loads, shortage of trained personnel, and a decision to carry greater fuel reserves over certain sections of the Empire routes. These, however, are explanations rather than justifiable excuses.

For the fleet shortage Imperial Airways are not altogether to blame. There was a considerable delay in the delivery of the landplane series which were ordered more or less at the same time as the flying-boat fleet, and there have been still further delays in getting them into service. Actually, some of the present Ensigns are now flying on the Paris route, and one or two may be used, temporarily and with reduced loads, on the overland route to India. In the meantime forty-eight Wright Cyclones have been ordered to equip eight of them, but these engines will not be available until Christmas, and even then it will be some time before they can be installed in the machines.

Another cause of the shortage has been the very considerable number of accidents involving the almost complete writing-off of a large number of Empire boats. The original twenty-nine has been whittled down to something like twenty—including replacements. Although it is hardly fair to blame the company in general for accidents which were in a large measure due to piloting errors, these errors may still be attributed indirectly to faulty management, since an insufficient amount of training may have been given to the crews, and it was the company, in any case, which decided, rightly or wrongly, to re-equip with flying-boats. At the time there were very few trained flying-boat pilots with Imperial Airways, and the majority of the new machines have had to be flown by landplane pilots after comparatively little special training.

Increasing Mail Loads

THIS crisis is not by any means a sudden one. During the last three months the company's difficulties have been obvious to all who were in any way connected with air transport. For instance, two of the strengthened "C" class boats designed for the Tasman service have been in use, with *Clyde*, one of the Atlantic boats, on the ordinary Empire routes. Furthermore, the experiences with the mail last Christmas showed clearly just how nearly, even then, the organisation had reached a crisis. Only the considerable efforts of the various crews and ground staff and the assistance given by the Royal Air Force saved the day last December.

From the company's point of view, the ideal loading of a "C" class boat involves the carriage of 2,200 lb. of mail. This loading enables the full complement of passengers to be carried. But the mail contract obliges Imperial Airways to carry as much as 5,500 lb. of mail on each Empire service. When the all-up scheme was instituted, this maximum was perfectly well understood, and Imperial Airways must have known that the mail loads would rise progressively month by month.

The inevitable increase has proved a great embarrassment to the company, since every addition to the 2,200 lb. figure means excluding some of the passengers, and tremendous difficulties have been experienced by the traffic department in arranging the loads so that no prospective passengers would be unduly inconvenienced. In fact, the mail loads carried have increased by nearly 50 per cent. since the first six months of last year.

The hardships involved in this sudden announcement to prospective Empire passengers are serious, but can be over-emphasised. Of late, as many as eleven hundred passengers a month have, on an average, been carried

for long or short distances on the Empire routes, and, even so, many bookings have had to be refused. But, luckily for the prospective passengers, and unluckily, from the prestige point of view, for Imperial Airways, there are other means of reaching home by air.

Hiatus

IN their desperation, Imperial Airways have not only curtailed accommodation on the Empire routes, but have applied to the Air Ministry for leave to buy American aeroplanes. They have already ordered American engines, and for this there is some excuse since no British engines of the required maximum power output are available in quantity.

The question to be decided is whether it is worse to curtail services than to risk the loss of the prestige involved in using foreign machines. Evidently Imperial Airways have decided that the first course would be the lesser of two evils. There is, however, a third course—and that is to make use of Service machines and Service crews for carrying the mail, while leaving the present fleet almost solely for passenger-carrying.

When Imperial Airways ordered the first series of Short "C" class boats they planned wisely for the fairly immediate future. Those boats have, on the whole, been a great success. The mistakes made by the company were to allow them a life of seven years before obsolescence, and to imagine that this fleet, even if not reduced by accident, would be ample for that period. It was almost as if the company made this major and important decision and then felt excused from the necessity of doing any more long-period planning.

Events, in fact, have moved too fast for the company. The time for ordering more machines was two years ago, and the result is that the nucleus of the new Corporation has to face the prospect of filling a temporary gap. It is unlikely that either the Short landplanes or the Fairey landplanes, which have been ordered for British Airways, will be in service before 1941. Somehow or other the intermediate period must be survived.

To blame either the rearmament policy or the industry itself for the fact that no machines are available is altogether unfair. Within the last two years several firms have submitted tenders for civil machines to the Air Ministry, but no orders were forthcoming. Only in the last six months or so has anything been done about it—and then through the efforts and influence of British Airways.

The Personnel Question

AS it happens, even if thirty new flying-boats or landplanes had been delivered in the spring of this year, there would still have been no one to fly them.

This fact, again, cannot altogether be blamed on Imperial Airways, but more considerable efforts, in the shape of active encouragement to prospective members of the flying staff, could easily have been made. It is quite true that, during the present expansion of the Royal Air Force, pilots are not readily available from that source, but for many years Imperial Airways have realised that Service training could be used only as a basis for the development of the qualifications demanded of an airline pilot.

Furthermore, even the most experienced of airline pilots is not, without special training, able to take charge of a flying-boat. British Airways have more thoroughly realised the necessity for post-graduate training, and their own school will probably form the basis of that now being organised to supply British Overseas Airways. British Airways' training scheme was just one of those invisible assets which alone more than justified their existence.

Within the last month, too, Imperial Airways have announced that they were placing *Maia* at the disposal of trainees and the experimental staff. That is a start, but it is not possible to train a large number of pilots, even if they are available, on one flying-boat. As a postscript we might mention that the Royal Air Force expansion scheme started in 1935; surely between then and now some provision could have been made for securing trained personnel in reasonably large numbers. We know dozens of young men, with a hundred or two hours of experience, who would once have jumped at the chance of advanced training and a position on the staff of Imperial Airways. In the end it will probably be necessary for British Overseas Airways to reverse the flying-boat policy—at least for a time. Not only are very few trained flying-boat pilots available, but the problem of the necessary bases is still a difficult one. Imperial Airways are not to be blamed for the disappointment over Langstone Harbour, and they themselves are very critical of Southampton Water as an Empire base.

If the Air Ministry had been so minded, something could have been done about a satisfactory base two years ago—though it is difficult enough to find a site which will give straight runs of not less than two miles in sheltered water anywhere along the south coast of England. This problem alone may drive the company back to the reconsideration of the landplane for the Empire services, though east and south of Singapore, and for the Tasman, Atlantic and Pacific services flying-boats are still the most suitable type for regular operation.

Necessary Action

FORGETTING mistakes and ill-luck, the fact still remains that the interim period must, somehow, be tided over while the directors of Imperial Airways and British Airways plan ahead once more. If it can possibly be avoided, we are very critical indeed of the idea of purchasing aeroplanes from America.

Such a course was necessary in the case of British Airways two years ago, but if direct and powerful action is taken now by the Air Ministry, there is no reason to suppose that the time lag before the delivery of machines already ordered, or about to be ordered, needs to be great enough to require quite such drastic measures. Early next year most of the Ensigns, as well as three or four "G" class boats should be in service, and by then, too, some of the already ordered De Havilland Flamingos may be available.

In the meantime the help of the Royal Air Force might well be enlisted. Last year the Middle East Command gave assistance to Imperial Airways in dealing with the Christmas mail loads, and the same sort of thing might be done, on a larger scale, once again.

In fact, it would be no bad thing for the long-range squadrons of the R.A.F. to carry mails. The experience obtained would be invaluable, and even if other training had to go by the board in the meantime, the gain would probably be greater than the loss. If the Post Office could be encouraged to permit such a thing, the bomber crews concerned might even take it in turns so that a body of very experienced pilots and navigators would be built up inside the Bomber Command. Machine modifications would be few, easy and comparatively inexpensive.

Whether or not Post Office consent could be obtained in view of its contract with Imperial Airways, remains

HIS MAJESTY INSPECTS THE R.N.R. : Last week the King made a journey of 14 miles around the 133 ships of the Reserve Fleet. The King's Barge is here seen following its escort past the aircraft carrier *Courageous* anchored in Weymouth Bay.

to be seen, but late delivery is the bugbear most objected to by the Post Office, and it would probably be the first to welcome any means of easing the present difficulty.

Parting of the Ways

ONE thing which emerges very clearly from this record of missed opportunities which is the history of British commercial aviation during the last few years is that *Flight* was right when, many years ago, it began to advocate the splitting up of Empire air services into mail and passenger traffic. We were laughed at for our pains, and were told that we did not know what we were talking about. Yet surely it is the very fact of trying to cater, in one type of aircraft, for mails and passengers which has prevented a long-range policy from being formed. If one begins by the assumption that mails require one type of aircraft, passengers another, the task of planning for the future becomes much less formidable.

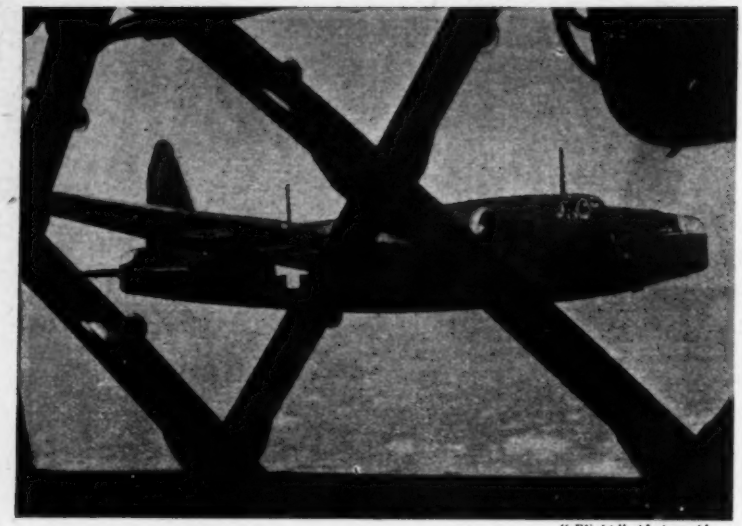
A load which consists entirely of mails is a very concentrated one, and the size of hull or fuselage necessary is very much smaller than that required for the comfortable accommodation of passengers. Thus from first principles it is absurd to carry mails in a flying boat, the depth of hull of which must in any case be great to provide ample airscrew clearance. While both mails and passengers were carried there was some excuse, but to use flying boats for mails only as is now to be done is fundamentally wrong.

The obvious thing to do is to get out immediately a mailplane specification. It should not be difficult. Between them the B.O.A. and the G.P.O. should be in a position to know, almost to a pound, the quantity of mails to be transported weekly, and once the pay load is settled and the designer is told the space his greatest load will occupy, the rest is a matter of straight design. The machine must be ultra efficient in order to get the cruising speed necessary, so the landplane is automatically selected.

When we come to passenger traffic the selection is less easy, but it must always be remembered that in trying to "guess" about future requirements one invariably underestimates requirements. Past experience shows that the aircraft which was thought far too large yesterday is proving too small to-day. As the limit in size is reached much sooner in landplanes than in flying boats it seems logical to assume that passengers should be carried in flying boats. In saying this we are not forgetting the somewhat unfortunate experience of the past, which has been due almost entirely to crews having had insufficient training.

The Air Exercise

THE interest taken in the air exercise held last week was unprecedented, partly because of the international situation and the anxieties felt last September, and partly because the first experiment in blacking-out London as well as a large tract of England invited the ordinary citizens to play an active part in the proceedings. The story of the sham fighting is told by members of the staff of *Flight*, so far as they were able to follow it, on pages 150-156 of this issue. But eye-witnesses can as a rule only see the trees, not the wood. Of the larger issues involved only the higher staffs are able to form authoritative judgments after study of all the facts; but certain reflections have been suggested by what has been made public. In this issue space is lacking for the publication of such ideas as have occurred to us, as it has been deemed desirable to comment adequately on the present position of British air transport. We hope, however, to give our impressions on the air exercise in our next issue.



"Flight" photograph.

A "friendly" Wellington as seen through the geodesics of a consort. The white cross was the distinguishing mark.

THE AIR EX

An Outline of Events : Pers pressio Al ack-Ou

THE annual Air Exercise in connection with the Air Defence of Great Britain took place between 8 p.m. on Tuesday, August 8, and 7 p.m. on Friday, August 11. Last year's Exercise involved 900 aircraft; this time more than 1,300 machines took part, which, according to the Air Ministry, is "an increase of about 50 per cent."

As usual it was emphasised that the exercise was not "manœuvres," but that it was planned rather to train the Forces engaged in the air and ground defences of the country in combating air attack in the area specified and to test the organisation and efficiency of the various units taking part. A large part of the country was involved, the area being south and east of the line Withernsea, Macclesfield, Droitwich, Hungerford, Salisbury and Bournemouth. This area was known as Westland and the scheme envisaged a situation in which the Westland defensive forces were pitted against the air might of Eastland, the territory of an imaginary power presumed to be situated somewhere in the North Sea to the east of the operational area.

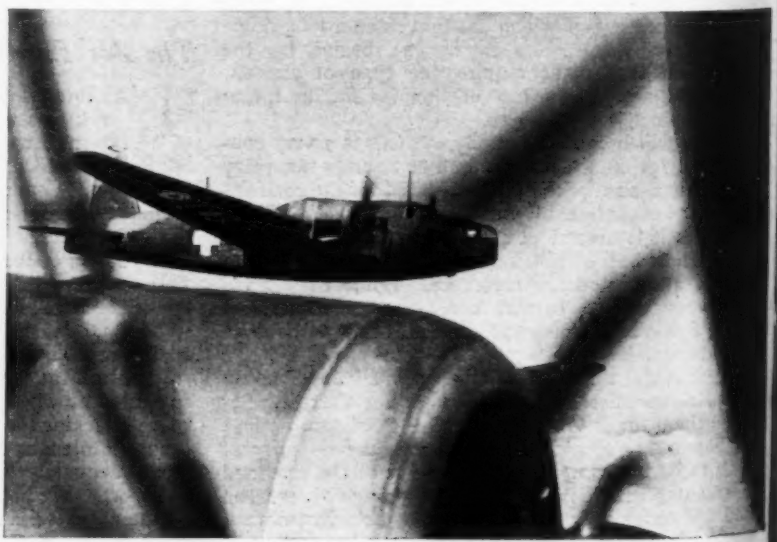
Of Westland's 800 aircraft, nearly 500 were fighters, about 50 general reconnaissance machines (operating mainly over the sea to defend Westland shipping), and the rest "friendly" bombers (included for their "nuisance" value). In addition there were four anti-aircraft divisions, 10 London Balloon Barrage Squadrons, and 15 Groups of the Observer Corps. All the Westland Forces were under the supreme command of Air Chief Marshal Sir Hugh C. T. Dowding (Air Officer Commanding-in-Chief Fighter Command), but the "friendly" bombers were controlled for operational purposes by Air Chief Marshal Sir Edgar R. Ludlow Hewitt (Air Officer Commanding-in-Chief, Bomber Command), who also commanded Eastland's attacking forces of 500 bombers of modern type.

Anti-aircraft units were provided by the 1st, 2nd, 4th and 5th Anti-Aircraft Divisions which constitute the first Anti-Aircraft Corps of the Territorial Army and were under the immediate command of Maj. Gen. Sir Frederick A. Pile. The precise location of the guns was kept secret.

All squadrons of the London Balloon Barrage were represented, and each unit flew a certain number of balloons. Air Comdre. J. G. Hearson was in command.

Last year seven groups of the Observer Corps gave their services, but this year there were fifteen groups to provide intelligence regarding the movements of "hostile" aircraft over their areas.

It was planned to hold black-outs over the whole of Westland between midnight and 4 a.m. on Thursday, excepting in the Metropolitan Police District of London, where lights were to be extinguished at 12.30 a.m. The



"Flight" photograph.

Another intimate glimpse of a "friendly" Wellington over the nacelle.

IEXERCISE

Pers[illegible]pressions from Ground and Air : The All[illegible]ack-Out

weather was such, however, that this part of the exercise was postponed until the following night.

Group Commanders were given considerable freedom in formulating the method and time for attacks. Bombers were allowed to proceed on to their objective in their original formations even though they may have been intercepted en route, providing as much training as possible for the ground defence personnel.

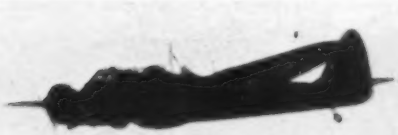
It was laid down that no operations were to be carried out below 4,000ft. within seven miles of Tower Bridge. Eastland bombers were allowed to fly without navigation lights except when flying over the sea beyond eight miles from the coast, between 3,000 and 4,000ft. above the defended area, below 4,000ft. in the areas used by civil aircraft or when other aircraft were approaching in such a manner as to involve the risk of a collision. At night fighter pilots intercepting bombers were told to flash their upward and downward recognition lights continuously for one minute to indicate that an attack had been made. Bombers replied with a similar signal. By day the routes of bombers were recorded either by photographs taken from the aircraft or by ground observers, and at night a bombing run was indicated by recognition lights and a release of bombs by Sashalite. They were recorded on the ground by camera obscura observation.

The following outline of the exercise is based on official bulletins It is followed by personal accounts of local activities, and a night raid over London is described.

On Tuesday evening it was rumoured that Eastland bombers had already taken up positions for sudden attack. Weather over Westland was unsettled with poor visibility and low cloud. Hostilities began at 8 p.m. and Eastland quickly thrust home a series of bombing raids from the Wash to points north of the Thames Estuary. During the first forty minutes eleven such raids were made. Despite this intense activity and the unsettled weather the observer system worked perfectly. Many squadrons of Westland bombers immediately

Blenheim fighters were used extensively. One of these machines is seen attacking a raiding Blenheim over the Thames Estuary.

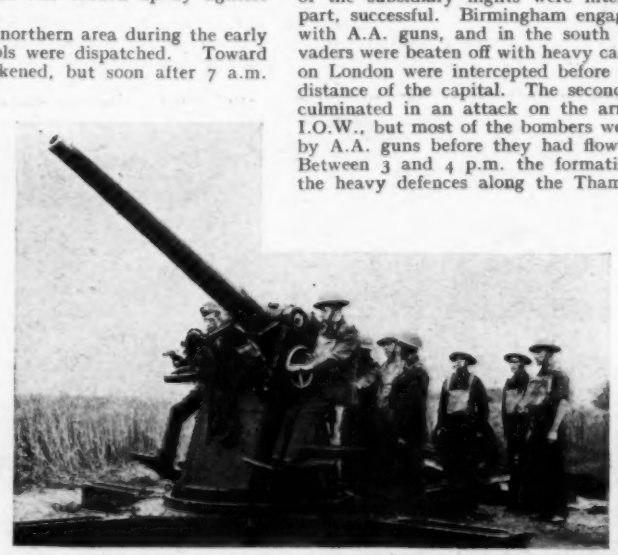
A Blenheim fighter takes off at dawn watched by attendants of a Hurricane.



Defending Spitfires show how their take-off has improved since the fitting of v.p. airscrews.

set out on counter raids. Two raids by Eastland bombers were made on South London, and A.A. batteries were heavily engaged. As early as 5.10 p.m. Eastland bombers were flying over the North Sea before turning westwards. Others flew S.E. towards the French coast, which they used as a turning point. Between 9.30 p.m. on Tuesday and 3.30 a.m. on the following day Eastland made a heavy offensive concentrating on the Thames Estuary, Kent, Surrey, Sussex, and South London, though in the early hours the attacks swung back to the northern and eastern areas. They were hampered by cloudy conditions, but nearly 100 raids were made and more than 60 fighter patrols were sent up, several interceptions being reported. The bombers flew at heights between 400 and 10,000ft., providing scope for light and heavy anti-aircraft artillery. A raid on Portsmouth was broken up by fighters and A.A. guns.

Sixty raids were made in the northern area during the early morning and forty fighter patrols were dispatched. Toward dawn the Eastland attack slackened, but soon after 7 a.m. observer posts detected bomber activity some miles off the South Coast. Between 8 and 9 o'clock a raid was made on Worthing and a small flight of Battles was intercepted over Southampton Water. Half an hour later a large bomber force was intercepted over the same area. The bombers then began to attack on a wider front and raiders were intercepted two miles north of Skegness. A dozen bombers were intercepted five miles north-west of Maidstone and three Battles were "bagged" near Tonbridge. Eleven machines of the same type were met by fighters over Southend. Then numbers of raiders began to converge on London. Eight formations began to move up the Thames Estuary and others swept up from the south-east counties. They met with sturdy opposition, though some succeeded in getting round London to the west where they had a hot reception in the neighbourhood of Uxbridge and Surbiton. The lull over the north area continued until 9.30. Between 10 and 11 a.m. raiders passed over Chelmsford and other points east of Cambridge. A squadron making for north-east London was beaten off by fighters and A.A. guns. Action over the east coast near the Wash began again between 10 and 11. Two raids converged on a point near Lincoln, and another penetrated as far as Burton-on-Trent. Apart from local fog and ground mist the weather was now fair. There was a lull in hostilities toward noon, but in the early afternoon bombers flew over London under heavy A.A. fire and were intercepted over Hyde Park by Spitfires. In the north the enemy crossed the coast north of Ipswich, and near Cambridge the formation broke up into four flights and attacked over a wide area. Although a number of the subsidiary flights were intercepted the raid was, in part, successful. Birmingham engaged a number of bombers with A.A. guns, and in the south and central areas the invaders were beaten off with heavy casualties. A series of raids on London were intercepted before they were within striking distance of the capital. The second raid on the south coast culminated in an attack on the army barracks at Newport, I.O.W., but most of the bombers were intercepted or engaged by A.A. guns before they had flown far beyond the coast. Between 3 and 4 p.m. the formation succeeded in avoiding the heavy defences along the Thames Estuary. The raiders



"Flight" photograph.

(Above) "Somewhere in Essex." A 3in. A.A. gun ready for the Eastland raiders.

"Flight" photograph.

On the left stalwarts of the Observer Corps uncover their "instrument" after a shower. Above is an aerodrome defence position with camera gun ready for action.

came in via the Kent coast and passed near Maidstone and Canterbury on their way to attack South London. Cloud was by this time becoming general, and the bombers took advantage of the weather. Westland fighters reported a number of victories, Spitfires meeting with particular luck over Cambridge, Spalding and Bassingbourn. To avoid risk to civil aircraft the balloon barrage was close-hauled. Enemy formations advancing on London were driven to alternative targets in Suffolk and Norfolk. Later in the evening the intensity of the attack waned, and at 10.33 it was agreed to bring operations temporarily to a standstill.

Hostilities were resumed at 5 o'clock on Thursday morning. In the south the weather was still bad, but one raid crossed the coast at Ramsgate, being engaged by A.A. guns. Aided by the weather in the north the enemy made fourteen raids between the Wash and Grimsby. Six were intercepted over Withering, Digby and Duxford, the latter having been the scene of a low flying attack on the previous evening. On Thursday morning an enemy raid got as far as Birmingham, but was compelled by A.A. guns to alter course for Wolverhampton and the Walsall district. Raiders flying toward Peterborough were beaten off near Wittering. They passed back over Mablethorpe pursued by fighters. Until 9.30 a.m. the bombers were compelled by the weather to use a narrow corridor which was comparatively free of cloud. The London balloon barrage was still close-hauled, but the weather was improving gradually.

Soon after 10 a.m. bombers made a series of raids of the East Coast. A large formation advanced up the Thames, passed over the Isle of Thanet and split into sub-formations.

One section flew S.S.W. to Maidstone and another made for South London. Both were engaged by fighters. Another formation crossed the coast north of Skegness and, escaping a fighter patrol, flew over Gainsborough and laid a course W.N.W. They were driven off by fighters in the neighbourhood of Finningley, Yorks. Another unit of enemy bombers crossed the coast over Mablethorpe and went on to Louth where they were met by fighters and were turned back over Lincoln which met them with A.A. fire. About 10.30 bombers crossed at Sheringham on their way to Norwich but were intercepted. A small raid was also made near Harwich but was short-lived thanks to fighters and A.A. guns.

Toward mid-day the weather again deteriorated, the clouds being from 100 to 1,000ft., and the visibility as low as 1,000 yards. These conditions enabled several bomber formations to complete their raids without being seen by fighters, though sometimes bombers were compelled to fly under the clouds, exposing themselves to the light anti-aircraft guns.

Low clouds and poor visibility prevailed until 3.30 p.m., but sporadic raids continued. Soon after 11 two low-flying attacks were made on an aerodrome near London. Some buildings were damaged by bombs, but personnel and aircraft escaped practically without harm. A few minutes later a small formation flying at about 400ft. attacked an aerodrome farther north. It was intercepted by Westland fighters, but owing to the poor visibility the defenders were unable with certainty to identify them and did not attack. Three raids were intercepted simultaneously near Newbury and over Oxford and Cambridge. In the early afternoon a solitary enemy bomber which appeared to be in difficulties flew over a Westland aerodrome and was shot down by three fighters.

On Thursday afternoon Sir Kingsley Wood, Secretary of State for Air, visited Westland headquarters where he was received by Air Chief Marshal Sir Hugh Dowding and expressed his keen appreciation of the success of the exercise to date.

Rain, low cloud and mist came in from the west and prevailed until the evening. An improvement followed and spread to all areas except the extreme south-west. Low-flying machines attempted to deliver attacks in the Midlands but were successfully engaged by fighters and A.A. guns. This form of attack was curbed when the balloon barrage was raised to operating height. The reports of bombs being dropped over areas of no military importance continued to show that the enemy was feeling the strain of sustained attacks by fighters and flying in bad weather. Shortly before midnight observer posts detected large bomber movements off the coast north of the Thames Estuary. At midnight the weather was improving, though there were low clouds and fog over large areas, but the defenders of London succeeded in deflecting the main tide of the offensive south of London. By 12.30 Westland was in darkness and the Eastland attack slackened, though at about 1 a.m. many formations crossed the coast north of the Wash on their way to the Midlands, which they attacked in face of very strong opposition. Toward 1.30 a.m. a number of formations were reported to be

(Right) Boarding an Eastland Wellington at Stradishall prior to a bombing raid over "blacked out" Westland.

As the sun sets the night-bombing Wellingtons are dragged from their hangars.

"Flight" photographs.

Mud: Pedicures for the Blenheim and the sergeant and, below, the de-bogging of a Hurricane.

flying towards Kent, and it was apparent that the invaders were preparing to strike hard at London. Formations began to converge upon the capital from the east and south between 1.30 a.m. and 2 a.m. Bombers which succeeded in evading the strong defence were unable with certainty to identify their objectives and were harassed by fighters. The attack slackened during the early hours, and a few raids along the coast were quickly engaged. During the night raids had been made on Staines, Southampton, Swindon, Droitwich, Poole Harbour, Peterborough, Newbury, and Trentham Hall, near Stoke-on-Trent. After 10 a.m. next morning there was a steady improvement in the weather, and defending fighters had good luck. One large formation of bombers flew up the Thames from the east but was forced to take refuge in clouds towards the south coast, later making for Salisbury, where it met with heavy opposition. Between noon and 4 p.m. on Friday nearly 150 raids were made in the Westland territory, half being made in the southern area. Few succeeded in approaching the capital. At 1.30 p.m. a number of raids were launched simultaneously along the coast from Southend to Orford.

A large formation of bombers was heavily engaged by twice its number of fighters over Southend. It made for Oxford, but was harassed by fighters and A.A. guns. In the north raids were directed at Huntingdon, Birmingham and Wolverhampton, and along the east coast from the Wash to the Humber. Bombers were also active over Norwich and Nottingham and over Oxford, Norfolk and Suffolk. Weather was mainly fair.

The last stage of the exercise was marked by the adoption of high flying tactics by the bombers. Activities ceased at 7 p.m., and Air Chief Marshal Sir Hugh Dowding signalled to all stations, "Well done, everybody."

BIGGIN HILL AND TANGMERE

From Wednesday mid-day to Thursday night operations came to a halt at Biggin Hill owing to an unpleasant mixture of low cloud—frequently to be found resting on the surrounding hills—rain and even mist. The resultant inactivity must have proved most trying for both pilots and ground personnel, for while no enemy were to be expected all stations had to be manned in readiness, and nothing is more unpleasant than seemingly eternal hours of waiting under such depressing conditions. Fortunately, during the earlier part of the exercises this station had been one of Westland's most active. Between Tuesday evening and Wednesday mid-day over two dozen raids had been successfully intercepted, although two Fairey Battles did succeed in a diving attack into a nearby valley.

For the purposes of the exercises four squadrons were operating from this station, three being ready for action during the day and one at night. These squadrons were composed of Hurricanes and fighter Blenheims, all of which were pegged down in their "dispersed" positions round the perimeter.

Down at Tangmere conditions were a trifle more exacting, and from the privileged visitor's viewpoint the more interesting, for the decree had gone forth that gas was to be expected. Sure enough a flight of three Hampdens came into view followed five minutes later by a flight of Wellingtons, both of which proceeded to fly over the aerodrome between 4,000 and 5,000ft. However, one inquisitive Wellington dived to bomb a line of Gladiators disposed in the far corner of the aerodrome. Gunners from their various strategic positions let lose with their camera guns.

Unfortunately the raid siren was a trifle late in announcing the arrival of the visitors, with a result that men complete with gas kit were to be seen still running to their shelters some time after the raid had passed, while the attacking Gladiators became very obviously just "pursuit ships." However, the delay was excusable for the attacking aircraft made full use of the small cumulus clouds, while the lookouts' task was made even more difficult by the presence of a number of Blenheims not taking part in the exercises. Apart from the delay the Gladiators were away in an incredibly short space of time, two flights taking off straight away down wind.

C. R. H.

HEARING BOTH SIDES

On Thursday afternoon and night the weather relented, and in the afternoon about half the sky was a clear blue up the eastern half of England. This gave the defence a much better chance of spotting the raiders, who could not take cover behind clouds. Consequently there was great activity at Duxford when I visited that station. Four squadrons of fighters, not all permanently stationed there, were drawn up round the perimeter of the aerodrome. There were Hurricanes, Spitfires, and fighter Blenheims. One of the squadrons was No. 504 (County of Nottingham) of the Auxiliary Air Force, under Sqn. Ldr. Sir Hugh Seely, M.P., which was doing its annual training in camp and was living under canvas on the station. Each unit had a temporary headquarters beside its machines, and the pilots were ready to take off at the shortest notice, except, of course, those who were detailed for night work.

While I was talking to the officers of one Spitfire squadron orders came through for a flight to take off. The engines were being kept warm, and were very quickly started. From this particular point on the aerodrome the machines were facing down wind, and they had to taxi out, turn into wind and then take off. I timed them roughly, and made it four and a half minutes before all the flight was in the air. If they had been facing into wind they would have been off in two minutes, and I could not help wondering whether some arrangement could not be devised whereby the squadron which was next for duty could be kept ready on the lee side of the aerodrome. At the speed of modern aeroplanes two and a half minutes seemed to be a good deal to sacrifice. Certainly no criticism could be levelled against the pilots and the airmen, who wasted not a fraction of a second in getting off and making for their patrol point.

Before long a patrol of Hurricanes came in and landed. They had had a successful flight, and an interesting one. While in the air they had received successive orders to patrol four separate parts, showing that the ground organisation was keeping well on the track of the raiders. At the fourth place the Hurricanes found the bombers, and duly shot them up. The fighters were putting in long days, for they started at 4 a.m. and remained on duty until 9 p.m., when the night squadrons took over.

"Rearming" a Hurricane, just returned from an interception, before the pilot has stopped his engines.

"Flight" photograph.

My second visit was to an Observer post. These are always difficult to find, even for official guides. This one was out in a field at the back of a golf club. I was shown the simple but effective instrument by which the men calculate the height and direction of the bomber and the spot of country over which it is flying. A high degree of accuracy is obtained, and as reports from a number of posts come in to the centre about the same time the men at the centre can rule out any error by one post. A post consists of one head special constable, a deputy and eighteen men. Only two at a time are necessary to work the instrument, but as the Observer Corps was on continuous duty day and night throughout the exercises plenty of reliefs were needed. A wooden hut was erected near by with two bunks in it. The callings of the Observers vary a lot according to the locality. Most of them are agricultural workers, but as this post was near a small town some of the members were tradesmen or professional men. The farm men preferred to work at night, the townsmen mostly put in time by day. All deserve great credit for the efforts they are making to guard the country. On the wet days and nights when the exercises opened they must have had a very uncomfortable time, as the Territorials also had, and it was chilly enough on the evening when I visited this post.

It is evident from all reports that the Observer Corps has scored one of the great successes of these exercises, reporting practically every raid with commendable accuracy. Yet not all the posts in that particular group were on duty. The active strength of that group could have been increased by some 30 per cent. if more posts had been wanted.

Next I theoretically crossed the North Sea and landed in Eastland, where the bombers lived. In actual fact I made for Wyton aerodrome, where I found two bomber squadrons. The old distinction between day bombers and night bombers has now been abolished, and both these squadrons had in turn been making raids by day and night. The bad weather of Tuesday and Wednesday had given them a very trying time. Lots of broken clouds are a great help to raiding bombers, but they give the pilots lots to think about. One squadron leader spoke of "frightful conditions." Up to that time those two squadrons had been making low-flying attacks, and sometimes the clouds had forced them down to about 100ft., when everyone had to be on the *qui vive* for sudden obstructions in the way. One of the squadrons had been ordered to attempt an unusual form of attack, starting off by crossing to France, turning there, and returning by a different route to test the defences. But on that occasion a depression had brought the clouds down right on to the water in the Channel, and that attack could not be carried out. Instead, the squadron was sent out over the North Sea for 80 to 100 miles, and came in over a heavily defended area. It found its objective, but it had been intercepted several times. Even when the squadrons were flying at 100ft. under low clouds the fighters had got on their tails. Of course, the bombers' air gunners were sure that they would have shot the fighters down, but in these exercises camera guns give no sure proof as all camera watches cannot be immaculately synchronised, and doubtless the fighter pilots were equally certain of their own victory. For the last day of the exercises these squadrons were to change over to high flying, coming in at 20,000ft. Evidently our bomber squadrons were getting some very fine practice out of the exercises. Up to Thursday evening the station had sent up formations on 15 raids, and about 70 per cent. of them had been intercepted by fighters.

As the night went on the sky cleared completely, and the stars were blazing with unusual brilliance as I reached a searchlight centre. Mars loomed low in the sky like a great red lantern, and, higher up, Jupiter (I think) looked like a huge starboard light. The air was cold, as in the late autumn, and the Territorials were wrapped up in all the clothes they could find. These searchlights were in a fighter zone, and the tactics of the lights vary according to whether they are in a fighter zone or a gun zone. In the fighter zone the rule (not always strictly kept) is that not more than three beams should engage one target (i.e., bomber), passing it on from one to another. In a gun zone it is permissible for as many as six beams to engage one target, as the extra light helps the gunners to make their calculations. The lamp which I saw had two hundred million candle power, and in favourable circumstances its range was up to 30,000ft. Its sound locator was of the old pattern, one man moving the lamp according to telephoned directions from a man on the sound locator, 50yd. away. But the later pattern of sound locator is now coming through in increasing numbers. With that pattern the man on the sound locator who makes allowance for the time lag of the sound moves his instrument and the lamp is automatically traversed and elevated according to his movements.

F. A. DE V. R.

AN ESSEX EXCURSION

Subdued lighting and the prospect of a typically soggy English summer night failed to depress the mess at North Weald just prior to the opening of hostilities. The likelihood of any aeronautical excitement, however, was remote enough to permit us to leave the aerodrome and, with the help of an officer (who obligingly "won" a map from a Hurricane's cockpit) and the counsel of the local constabulary, to track down some searchlights which were surrounded by a vast acreage of mud. We were welcomed by the "Terriers," but as photography of their new-type sound locater was forbidden we squelched our way back and turned in soon after midnight, having seen nothing and heard little of the war.

Next morning, as we made our way round the "dispersed" Hurricanes and fighter Blenheims, we learned that after a weather test at 10.30 on the previous night conditions were

A "friendly" Wellington slips low over East Anglia. These non-combatant machines were included for their "nuisance value."

"Flight" photograph.

All Set : A Hurricane (with v.p. airscrew) with pilot donning his brolly, starter ready, and flaps depressed for take-off.

pronounced good enough to warrant sending up the usual night patrols.

We derived great satisfaction from watching the v.p. Hurricanes ("Hurry-buses") taking off "just like the old Furies," as one of their pilots put it, and buttonholed a Hurricane pilot, who told us that shortly before our arrival five machines of his squadron had been ordered off. They received orders in the air and caught a formation of Battles sneaking in over the Estuary at about 8,000ft. His story was not embellished with detail, which in a way is just as well, as we have space to refer to the splendid work of the ground personnel who rearmed, refuelled and inspected the Hurricanes after each interception. The armourers were kneeling on the wings and had the gun covers open before the pilots had switched off.

Incidentally, these eight-gun fighters are by no means the delicate, mollycoddled machines they are sometimes made out to be. During the exercises we saw Hurricanes and Spitfires "dispersed" night after night round the aerodrome boundary, frequently getting bogged and pounced on in no hesitant fashion on their return from the fray.

At Hornchurch we drew a blank. This station disposed of more fighter Blenheims, in addition to two squadrons of v.p. Spitfires. A Spitfire pilot told us that at 9.15 that morning six machines, in two flights of three, were ordered by R/T to 17,000ft. to intercept a raid approaching from the east. Sure enough, they found a dozen Battles in tight vics of three; and promptly attacked by flights, using camera guns.

After some hours waiting we deserted the Spitfires and did some plain and fancy cross-country driving to ferret out a gun emplacement. That mud was enough to discourage the most ardent spy or *saboteur*. The officer in charge sympathised and rewarded us with an account of how his battery uses its height finder, Vickers predictor, identification telescope (identification is his personal responsibility) and the brace of modernised 3in. guns. The alarm was an old brake drum and the mounting for the Lewis gun was composed of a section of tree trunk and the front forks of a bicycle. But the detachment was not one scrap the less efficient for that.

OVER THE BLACK-OUT

On Thursday we motored through the sunny afternoon to Honington, not far from Bury St. Edmunds. It was from here that we were to take off in a raiding Eastland Wellington to do some dirty work London way. Soon we were well acquainted with the Flight Lieutenant who was to be our pilot and who had been with the squadron since the days of Virginias. This knowledge made one feel very daring and resolute that Newbury Racecourse, our target, should be well and truly plastered, even should one be obliged to get out and look for it, for the lights o' London were soon due to be extinguished.

We wriggled into overalls, "Mae West" jacket and parachute harness, only to remember that our journalistic stock-in-trade reposed in our hip pocket, which by then was practically inaccessible. The navigator came to the rescue with a pad, adding a supply of nuts and raisins and other delicacies to while away the hours. But something told us that we should have plenty to occupy us.

The cabin of the "blacked out" Wellington was like the dim nave of a Gothic cathedral. One installed oneself beside the pilot and the big Vickers was soon charging down the flare path and sailing seawards. Lowestoft passed below as we nosed up through ice to 18,000ft., where we stayed for an asthmatic half-hour, turning south to get into position for the raid. Observation of incidental instruments was done by flashlight, though the navigator occasionally switched on the cabin light. The blowers were now set in high gear.

As we nosed in north of Southend we were somewhat shaken to see the familiar London glow, though it was, admittedly, subdued. The Estuary water showed up clearly near the lighted buoys, and we saw distinct red lights which we assumed to mark the Dagenham pylons. We were unmistakably over London, though it was difficult to get exact bearings, the lights being in broken masses.

We set a slightly southerly course and the searchlights started to grope around us in dozens, so very near and yet so far. The Flight Lieutenant steered straight for any beam which erected itself ahead, and every time it moved just as we were about to pass into it. But a rising chuckle was squashed by a sudden brilliant illumination of the front turret in which we were now installed, and by the sight of another great black Wellington formating a few feet above. Hasty thoughts of a brolly and a dive through the emergency exit were quickly cancelled by recollections of the tricks played by lights, interposed objects and banks of cloud. We groped meditatively for a Brazil, but were soon grasping the gun "handlebars" as the Flight Lieutenant started ducking our ponderous craft through a field of beams, periodically changing the pitch of one Pegasus to "fox" the sound locators.

One or two pairs of navigation lights slipped by below us. Fighters were on the prowl and they could not see us. One wanted to smirk and chuckle again, for it seemed such a grand game—until one remembered, and though——.

And so we droned on with stars above and wavering pillars of light below on course for Newbury. One more light caught us fairly and squarely, but we dodged behind a cloud.

Of the actual success of our attack we know nothing, but we indicated our run on the our recognition lights and set off our Sashalites before turning for Bury and the North Sea. As we went we watched those groping beams criss-crossing the night sky. It seemed like a Hollywood first-night and, somehow, like the Fifth of November.

But it was none of these. It was a rehearsal for war, grim and loathsome. May everyone who sees London as we saw it, through the nose of a bomber, wear the familiar blue or be, like us, a grateful guest of the Service. H. F. K.

"Flight" photograph.

A Hornchurch tea party : Spitfire pilots find respite from the boredom of waiting.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

DETERRING PRIVATE OWNERS

An Appeal to Instructors

ON numerous occasions I have heard conversations between instructors and keen amateur pilots where advice is being asked as to the merits of certain secondhand or new aircraft, and the inevitable result seems to be that the prospective owner buys nothing at all, but just carries on grumbling that he cannot get club aircraft to fly when he requires them.

Here is the usual reason—an instructor does not look at the situation from an owner's point of view, but expresses himself as if the club were going to buy the aircraft for instructional purposes. He just says without much thought, "For God's sake don't touch a Playwright Premier—so and so killed himself in one," or "Where are you going to sell it," or "You'll never get parts for a Landscape Vaulter, they're obsolete" (so are most secondhand aircraft anyway).

I want to make an honest appeal to instructors who read this to try to remember the amount of experience a man will gain through being a private owner of any sort of flyable aircraft, and not to recommend only those machines of their own fancy which are in most cases out of reach of the ordinary prospective owner's pocket.

A few years ago the opportunity arose wherein I was offered a machine in exchange for a car and I fell for the idea after seeing that the logbooks showed good C of A, which cost about £75 only six flying hours ago. The first instructor I saw after repainting my baby was the man who had taught me to fly, and he simply expressed surprise at my foolishness after all his tuition.

Well, I did 250 hours in that machine, of the most enjoyable and self-instructive flying one could wish for. I flew when and where I wanted, including long trips at six in the morning, and sold the machine after 22 months for what I paid for it. I had two similar machines later with the same flying successes.

There are lots of types advertised with C of A's from £175 to £300 and a little careful inspection by a sociable ground engineer will find a useful one; my advice to would-be private owners is, if you want a machine, buy one—whether by yourself or between a small syndicate. You'll not regret it.

Look at the grouses in the weekly papers—you can't expect to have all the fun and gain all that useful experience, which you can have with your own machine, on club craft. Against hanging around an aerodrome waiting for a machine just to fly to another airport, and having to be back at a certain hour, compare taking-off (complete with girl friend) and landing near a nice little guest house in the country using a 250 yard field, and then flying back as the sun sets. The clubs can't offer anything to touch it for fun and experience.

Wallasey. ERIC WARD.

AIR PASSENGERS AND LIFE INSURANCE

An Empire-route Traveller's Plaint

I FLEW recently from South Africa to England as a passenger by Imperial Airways—incidentally, my fourth trip by air between these two countries. Shortly before leaving South Africa, I had applied for a life insurance policy to one of your old-established insurance companies; and on my arrival here I was approached by one of their representatives and requested to complete a form dealing with aerial travel. I may say that I am insured with one American and one South African company, and that neither of these had imposed any restriction on my travelling by air as a passenger on an established line. Consequently. I have, for several years, done all my travelling by air, not, however, without carefully choosing the organisations which I use for this purpose.

I was, therefore, greatly surprised when I was informed, in due course, by the insurance company—no names, no pack drill—that they would accept my application only on condition that I paid an additional very substantial premium for the next ten years, the specific reason being my preference for flying. I protested, of course, and was later informed by the company that they would accept my application provided that I took out a special policy every time that I made a trip between South Africa and England, for which they quoted me a premium of 10s. per cent. for the round trip.

My reason for writing you is to call attention to the handicap which such action on the part of an insurance company imposes on air travel. I do not know whether the attitude of this particular company is typical of all insurance companies in this country. If so, it must discourage many business and professional men from making use of the air as a time-saving medium. Personally, I feel much safer in the air than in crossing the streets in your busy metropolis, or in Paris, or even in Johannesburg; and if you can do anything towards altering the position taken up by life insurance companies in respect of air travel many will "arise and call you blessed."

A. M. JACOBS, Chief Engineer, Electricity Supply Commission (South Africa).

THE MOMENTUM THEORY OF INDUCED DRAG

Lanchester's Early Work

I AM glad to see the interesting article by Dr. Taylor in *The Aircraft Engineer* of Aug. 3, in which he states the Momentum Theory of Induced Drag so clearly and concisely, as it draws attention to this alternative approach to aerofoil theory which seems so often to be overlooked.

On account of this latter circumstance, however, I feel it should be mentioned that the theory is, of course, not new. It was included in a paper read by Lanchester himself before the Royal Aeronautical Society a few years ago, and I was under the impression that he had originated it long before that, though in this I may be in error.

As Dr. Taylor indicates, the method does not, by itself, lead to numerical results of direct value to the designer, so for actual performance, stability and load distribution calculations the more involved Lanchester-Prandtl theory is indispensable. Nevertheless, the momentum theory does help in correlating our lines of thought and assist us in visualising, even if somewhat crudely, the mechanism of aerofoil action.

Almondsbury. FRANK G. EVANS, B.Sc., A.F.R.Ac.S.

USEFULNESS OF THE C.A.G.

Establishing an "A" Class

AS one of the many club committee members who have been trying to make the C.A.G. efficient, I should be glad if you could spare a little space in your columns.

The C.A.G., if it is to be of any use to the country, must be of use now and not in three to four year's time. In a few years the R.A.F.V.R. and R.A.F.A.R. will be producing an abundant supply of pilots.

Even now with the present interest in aviation the flying clubs could live on, and surely the idea of joy-flights for girls and old men is dead.

So, to attain this objective of immediate use, I suggest that instead of trying to train a force of 10,000 pilots, we should pick out about 1,500 of good physical standard who show aptitude for flying and concentrate on making these efficient pilots up to service standard, giving them over 40 hours per year. These would be the class "A" C.A.Gs.

As regards the rest, we should get rid of all of them with the exception of experienced pilots, by this I mean people who have done over 60 hours. Of the 5-600 pilots of this class, mostly the older club members who are, perhaps, not quite physically fit for the R.A.F. but many of them expert pilots. They would form the basis of a ferry service. There would always be a lot of pilots during a war, who, while not fit to fly fighters owing to injury, sickness, etc., could also be of use for ferry work. All these C.A.G. pilots could be used now and should receive at least 30 hours training a year, most of it on service types that they will have to fly.

The flying should be free and the C.A.G. incorporated in the R.A.F. Only by some such scheme as this shall we get the best value out of our instructors and train people for real use in a war.

It is quite ridiculous to just teach a pupil to handle a 'plane and then turn him loose for ten hours a year.

Also what real good is a pilot trained on ultra lightweight machines when they take almost as long to send solo on a service type as a novice. PRO PATRIA.

AN A.A.F. BADGE ?

Keeping Up With "T.A."

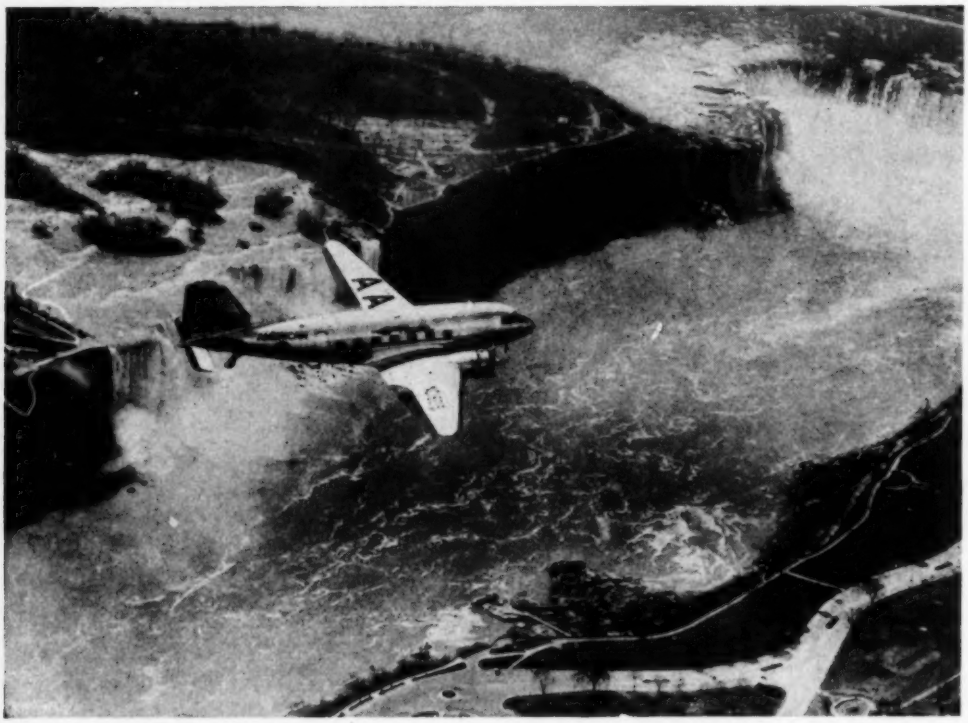
IN these days of unprecedented expansion of the Territorial Army, one sees the now familiar "T.A." badge everywhere. The Auxiliary Air Force squadrons are partly supported by the local Territorial Army Associations, so what about an "A.A.F." badge? Rumours of such a badge have been current for two or three years now, but I have yet to meet an Auxiliary airman who has seen one. It does seem that the Auxiliaries are hidden under the Territorial Army and the Volunteer Reserve.

London, S.W.17. F. RONALD JORDAN.

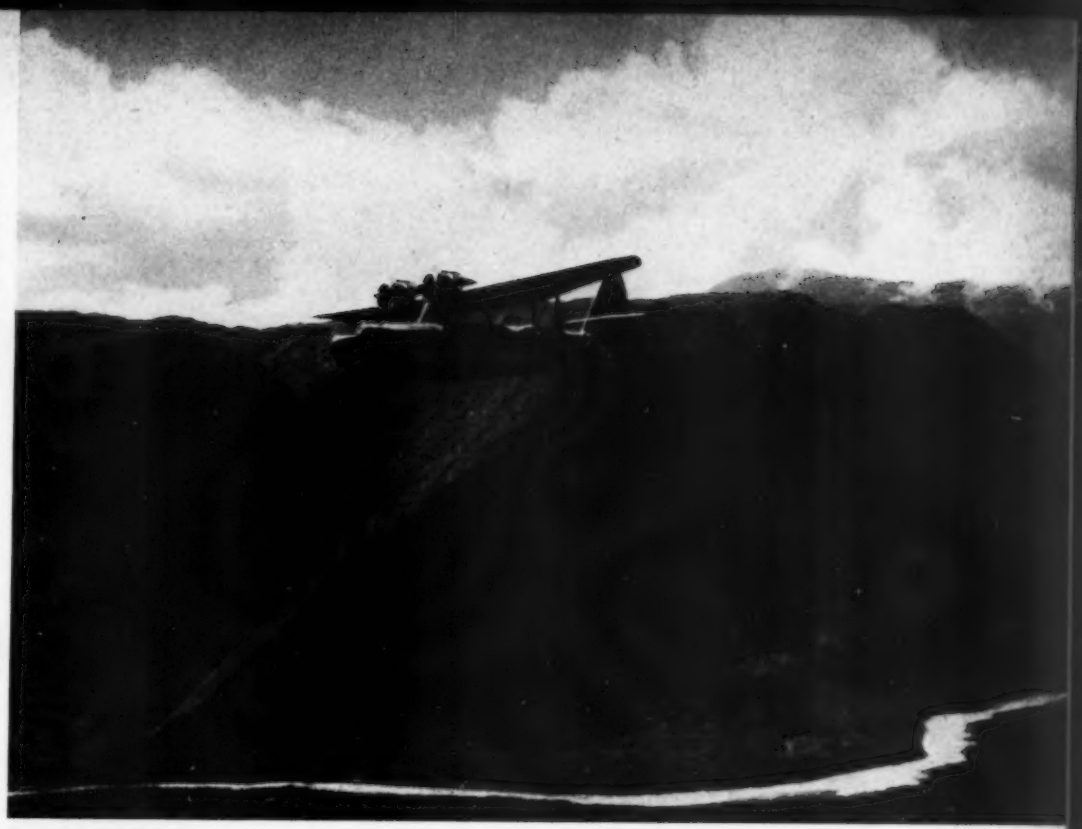
Manhattan sky-line : One of the Transcontinental and Western Air Douglas D.S.T.s, or Sleeper Transports, flying over the *Normandie*, with the sky-scraper forest of New York in the background and Brooklyn Bridge in the distance on the right.

AROUND THE WORLD

A Few Purely Civil Impressions : From Hawaii to Africa and Sydney to Manhattan



(Below left) An American Air-lines D.C.3 over Niagara, with the American falls on the left and the real Niagara on the right.



Inter-Island Airways, the transport company linking the Sandwich group, use Sikorsky S.43 amphibians, one of which is seen flying over the coastline of Hawaii. The apparently bare and gloomy rock is, in fact, a mass of vegetation.

(Below) One of many remarkable photographs taken of the Messerschmitt Taifun.

On tow : A Power Boat taking one of the Short "C" class boats to its moorings in Rose Bay, Sydney.

(Below) A glimpse of the D.L.H. "Offices" at Bathurst from the control cabin of one of the Blohm and Voss Ha.139 floatplanes used for Atlantic crossings.

RAIDING by CELESTIAL NAVIGATION

An Imaginary Account with a Practical Basis

By FRANCIS CHICHESTER

This article—the story of an imaginary bombing raid—written by one acknowledged to be an authority on air navigation, may seem fantastic in its conception; but a careful study by anyone with a fair knowledge of celestial navigation will reveal the practicability of the author's suggestions. Though the story itself is gripping enough, he deals with navigational procedure in considerable detail, and the article will continue in future issues. The instalments should be retained for reference.

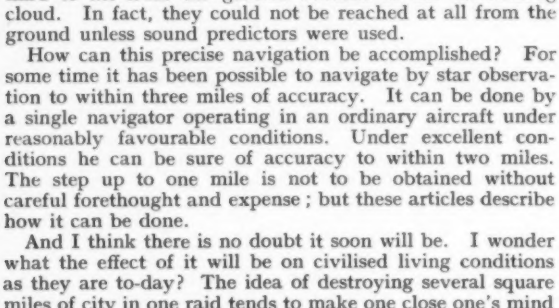
THE time has come when the pilot of an aeroplane out of sight of the earth can know his position to within one mile. This series of articles is intended to show in some detail how a formation of bombers can be navigated on a raid of a thousand miles, above cloud the whole time and knowing its position to within less than one mile, wind notwithstanding.

The significance of this is great. For instance, it means that 240 bombers, flying above cloud and each dropping 25 250-lb. bombs at 50-yd. intervals, could obliterate all buildings in an area of 4,000 yd. by 3,750 yd., that is to say, 4¾ sq. miles; and because the centre of this area would be known to within a mile they could destroy any pin-point target they liked in such a raid.

This large number of bombers would be hard to attack from the air, because they could turn about 500 guns on to any aircraft approaching them. And they would be hard to hit from the ground because of the intervening cloud. In fact, they could not be reached at all from the ground unless sound predictors were used.

How can this precise navigation be accomplished? For some time it has been possible to navigate by star observation to within three miles of accuracy. It can be done by a single navigator operating in an ordinary aircraft under reasonably favourable conditions. Under excellent conditions he can be sure of accuracy to within two miles. The step up to one mile is not to be obtained without careful forethought and expense; but these articles describe how it can be done.

And I think there is no doubt it soon will be. I wonder what the effect of it will be on civilised living conditions as they are to-day? The idea of destroying several square miles of city in one raid tends to make one close one's mind to the possibility of it and dismiss it as fantastic—which seems to be the chief defence to-day: the bomber can get through, and get home again, too. Air offensiveness has hopelessly outstripped defence, a fact which I recently heard a distinguished air marshal, unfortunately now retired and whose name I may not mention, drive home in a few hard-hitting, trenchant sentences.



A sketch plan of the different courses to be followed during the raid on a very imaginary enemy in the Atlantic Ocean. In later instalments charts will be reproduced to show the details of each position computation as the flight progresses. This first article deals mainly with the principles involved and with the careful preparations made for the raiding flight.

This first section of the description of an imaginary raid explains how the most suitable aeroplane was chosen to lead the formation, and how it was specially prepared for a team of navigators to work in it at 25,000ft.; how the flight preparations were made; and how the most suitable navigational stars were selected. The computation for finding the correct course is given, and for finding the true air speeds at different heights and temperatures. For the latter the Dalton "G" dead-reckoning computer was used, an instrument which has been adopted by the R.A.F.

* * *

"With what accuracy can you know your position in the air 25,000 feet up?"

"Within one mile."

"What! flying at 300 miles an hour? That's doing a mile in 12 seconds, you know."

"We have to work with accurate time, in any case, when using celestial navigation. We find out where we were at a certain time, and that time is correct to within two seconds. If, therefore, we start a stop-watch at that moment, and the aircraft is doing exactly 300 miles an hour, we shall know equally well where we are 12 seconds later, namely, one mile farther on. Two minutes later we shall be 10 miles farther on, and so forth. We can determine the ground-speed with considerable accuracy every half-hour or even less if great accuracy is required. It is unlikely to change much in 15 minutes."

"Even so, I don't see how you can work to an accuracy of one mile."

"It means a picked aeroplane with some structural alterations made to it, and a picked crew of eight navigators."

"Right, you can have a free hand in all that. The expense is negligible if it will enable you to lead two bombers with the precision you claim and with a possibility of escaping

Raiding by Celestial Navigation (contd.)

detection right to the moment of releasing their bombs. Here's the job: they want us to have a shot at blowing this old castle out of existence on some night beween the 10th and 20th of August. They have certain information that the arch-enemy is going to be there with the chiefs of his naval and air staffs; and also the chief of the military staff, who is to be brought back from the front for a general conference. If they could all be blotted out, it is considered that this idiotic war would end at once. It will be difficult; the harbour will be stuffed full of warships, the town will have 200 anti-aircraft guns in it, and there will be dozens of barrage balloons ready to send up at the least alarm; plus, of course, about ten squadrons of interceptors at the aerodrome. Your only chance will be to unpack all your eggs on the castle before they know you have even left England."

The navigator, Drake, studied the chart. Obviously, he would have to avoid the land as much as possible if the raid was to be a complete surprise. To do this he must set a course from Plymouth of approximately 240° to the point F. He must then fly on a course of 300° to E. From there he could run down between the island and the mainland to the objective A. Between F and E was the greatest danger. A row of guard ships fitted with aircraft detection gear were anchored at intervals right across from the island to the mainland. The enemy had no fear of naval attack there because the channel was heavily mined, the shores were strongly fortified, and the narrow passage twisted through interminable stretches of sandbank which nearly uncovered at low tide.

Drake took up several machines, at noon, to discover the steadiest of them. He set each on a course so that the sun could be observed dead abeam with a bubble sextant. The automatic pilot was set going. The sextant was set to the sun's meridian altitude for day and place. He sighted the sun so that it appeared in the centre of the bubble field and noted how much the bubble moved up and down away from the sun on either side of it. In an absolutely stable aeroplane the sun and bubble would have remained coincident, of course. The beam observations of the sun informed him which aeroplane caused the least acceleration due to yaw. Similar observation of the sun dead ahead revealed which had least pitching moment. When one of his pilots suggested that he should try a machine without an automatic pilot he merely laughed. These experiments were made low down; the air at 25,000 feet would be almost, if not quite, smooth.

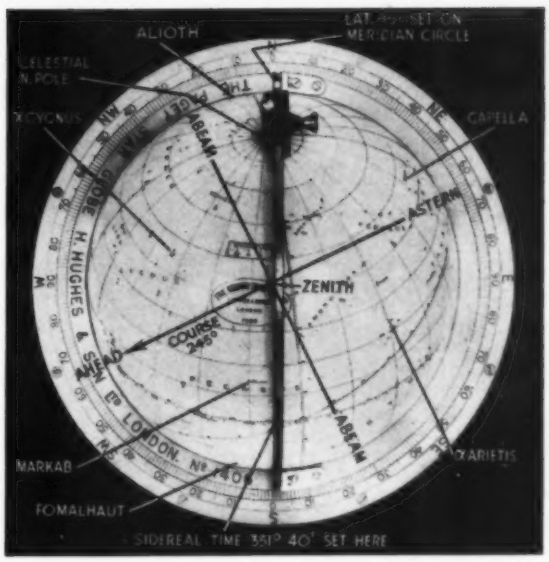
Preparations

He had the chosen machine prepared so that four navigators could observe from it simultaneously. An elongated turret, the shape of a narrow, inverted river-punt, was constructed along the top of the fuselage. In each side, at each end, and at the top were inset four panels of optically true plate glass, through which observations could be made free of refraction errors. The glass was electrically heated to prevent fogging. Four small light-proof cabins were constructed with entrances curtained off to allow easy access to the observers, but to prevent any escape of light which would seriously impair star observing. The interior of the aeroplane constituted one large pressure cabin, to be maintained at normal atmospheric pressure by means of a constant supply of air compressed and fed with oxygen into the cabin. The machines carrying the bomb loads were to use oxygen in the normal manner.

He chose the team of navigators from men who had done more than 100 hours celestial navigation, and the personal equation of each of the four observers was found by taking a number of test star sights from a known position on the ground.

The best time to reach the objective was considered to be 2 a.m. local time. The longitude of A being 25° west of Greenwich, the corresponding G.M.T. was 100 minutes later, *i.e.*, 03.40 hours G.M.T. The sidereal time at Greenwich at 03.40 G.M.T. was looked up in the *Almanac* for each night on which the raid might take place. On August 14, 1939, the actual night, it was 16° 40¼′. At A the sidereal time at this particular moment was 25° earlier, *i.e.*, 351° 40¼′.

A star globe was set for this local sidereal time and for the latitude of A, 45° North; it then showed the heavens as they would appear at A at that time. One of the reading arms of the star globe was set at the azimuth scale to the approximate final course, 245°. Any stars along that arm were fore or aft stars, and any under or near the other arm at right angles to it were beam stars. The best for navigation would be two appearing at right angles to each other. Capella would be within 10° of directly astern and most suitable for giving—without reference to any other star—the exact distance still to go when near the objective. He set one arm to it and read off its altitude, 32½° and azimuth 55°. He then



The star globe as it was set for the attack at 3.40 G.M.T. on August 14, and for a latitude of 45° N. By means of it were chosen the most suitable stars for celestial sights throughout the flight.

noted which bright stars made a good cut with Capella; that is to say, of 45° or more. These included all the Great Bear, Vega, α Cygnus, Fomalhaut, Markab, and α Arietis.

Drake then set the star globe for an hour after the estimated time of the *start* of the flight.

Expecting to make good a ground speed of 200 knots against a possible head wind of 40 knots of 25,000ft., it would take about five hours to fly the 1,000 miles. (*Note.*—Whenever the term "mile" is used in this navigation description it refers to "nautical mile," corresponding to 1′ of arc in the altitude of a star.) This would necessitate starting at about 22.40 G.M.T., August 13. Presuming the flight covered a distance of 120 miles in the first hour, the star globe was set for an hour after the start, 23.40 G.M.T., and for a position roughly 120 miles along the course from Plymouth. The approximate position of this point G was 6¾° W. 49½° N. The G.S.T. at 23.40 G.M.T. was 316° 30¼′. At long. 6¾° W. the local sidereal time was approximately 310°. Setting the star globe for this time and a latitude of 49½°, it was seen that Capella had an altitude of 15½°, and an azimuth of 34½°, which was highly suitable. Of the stars available at the end of the flight for a cut with Capella, the following were seen to be suitable for the beginning also: All the Great Bear, Markab, and α Arietis. Drake decided to use ε Ursa Major (Alioth) of altitude 28°, azimuth 33° west of North.

Zero Hour

On the 12th, word came through from Intelligence that the conference in the castle was to be held on the night of August 13-14; also that a considerable fleet would be anchored in the harbour as escort, and that all the cruisers were armed with multiple pom-poms. If the raiders were detected on their way, one of our agents would make a wireless signal on a certain wavelength to warn them and save them from flying into certain destruction.

The night of the 9th-10th had been clear and fine, but it looked as though bad weather was brewing in the Atlantic; and so it turned out. It rapidly grew worse, and the night of the 13-14th was stormy, with 10/10ths cloud, blowing 35 m.p.h. from the S.W. and the ceiling down to 1,000ft. It was a foul, black night. Drake set his compass course before the start. It was 258° made up of True Course 242° + 13° Magnetic Variation West + 3° Deviation West.

The true course between Rame Head and F was found by means of an ordinary 10in. slide rule to be 242° 04′.

The three aircraft took off together, a bomber on each side of Drake and his navigation machine. Drake carried no bombs. Each of the other two had a load of 5,000 lb., com-

Raiding by Celestial Navigation (contd.)

prising two 2,000-lb. bombs of H.E., four 250-lb. bombs of gas and explosives incendiary. They were fitted with delay-action fuses and were arranged for release in two lots.

The type of machine used is still on the Secret List, but I can say that it could carry a full load 1,500 miles and return empty without anxiety about fuel. It was powered with two of the new 2,000 h.p. fuel-oil-burning motors, fitted with silencers which could be cut in or out as required. No radio was to be used during the flight for fear that it would enable the detectors to pick them up. Whether at 25,000ft. they could slip over the lightships without being detected by cathode-ray devices, supposing the enemy had them, remained to be seen.

The cloud ceiling was down to 1,000ft. As soon as they reached that they split formation, the bombers each altering course 5° outwards from the navigation machine. They climbed through a deep belt of dirty stuff, wild, bumpy and black as the bowels of Mars. But at 18,000ft. Drake emerged and found himself in a gloomy chasm between towering black alto-cumulus. However, even this was cleared at 23,000ft., and he then found himself flying over a starry bright sky over a vast bed of cloud boulders.

He had kept the indicated air speed at 130 knots on the way up. (The instrument reading was adjusted for instrument error and pitot-head position error.) The air speed covered was found approximately from the air-speed correction scale on the Dalton "G" computer.

Up to 5,000ft., with temperature 0° Centrigrade at 2,500ft., the true air speed for an average height of 2,500ft. and indicated air speed 130 knots was read off as the corrected figure of 132½ knots.

Distance flown in 5 minutes at 132½ knots = 11 miles.

Average Height	Average Temperature	True Air speed	Distance flown in 5 minutes
Feet		Knots	Miles
2,500	0° C.	132½	11.0
7,500	− 5°	144	12.0
12,500	−10°	156	13.0
17,500	−15	170	14.2
22,500	−20	184½	15.4
			65.6

Distance flown in 25 minutes = 66 miles.

At 25,000ft. Drake decreased the indicated air speed to 107 knots, but continued to climb till the altimeter showed 26,500ft., when he carefully levelled off while holding the same air speed.

With temperature −23°, the true altitude for an indicated altitude of 26,500ft. was seen from the Dalton "G" to be 25,000ft.

How the altitude correction for temperature was made on the Dalton "G" computer. When the altimeter was showing 26,500 feet at a temperature of 23° C. the true altitude was 25,000 feet—that chosen for the flight.

With indicated altitude 26,500ft. and the temperature −23°, an indicated air speed of 107 knots represented a true air speed of 162½ knots.

On clearing the clouds, he had ordered a powerful beacon light to be turned on in the navigation superstructure, and flew on at the slow speed, waiting for the others to find and join him; their instructions were to change course 10° inwards as soon as they cleared the clouds, and to keep a sharp look out for Drake's beacon, which should be visible 10 miles away at their own level or below them.

Thirty-six minutes after the start, the port-side bomber ranged up alongside, and half a minute later the other arrived. This was at 23.23½ G.M.T. (they had been 7 minutes late in starting and had passed over Rame Head at 22.47 G.M.T.).

(To be continued.)

Navigational Training in Scotland

SOME little time ago Flt. Lt. C. W. Martin, the principal of the Imperial School of Air Navigation (of London) and of Martin Navigation (of Shoreham), joined the staff of Scottish Aviation at Prestwick. This company has acquired the goodwill of the I.S.A.N., and has consequently started a scheme for the training of commercial pilots for their First and Second Class Navigators' Licences.

As before, there will be correspondence courses for each of the syllabuses, as well as twelve-week day courses for the Second Class Licence, and pre-examination revision courses for both First and Second Class syllabuses. Flt. Lt. Martin is one of the best-known navigation instructors, and at his London school a very large number of civil pilots were successfully trained either directly at the centre or by correspondence methods.

Meanwhile, Scottish Aviation has obtained a contract for the training of air crews, in observation, wireless operation and air gunnery, at the R.A.F. aerodrome at Abbotsinch, Paisley. The personnel will be attached to the Glasgow town headquarters of the R.A.F.V.R. An additional course for the training of direct-entry air observers for the R.A.F. is also being started at Grangemouth, the site of the new Central Scotland airport which, with its opening ceremony, was described in *Flight* of July 6.

The Luscombe in England

THE only all-metal machine in the "very-light" class, the Luscombe 8, will shortly be available in this country. Aeronautical and Industrial Services, of Southampton, have been negotiating for the agency in this country and have now obtained it. Mr. R. F. Graham, who is Capt. Warren Merriam's partner in A.I.S., has recently been in the United States for this purpose. Arrangements have been made for Cunliffe Owen Aircraft to assemble and pass the machines out after the test.

The Luscombe, which is, so to speak, the young brother of the old Phantom, is a high-wing side-by-side seater monoplane, laid out in conventional American fashion, but with a monocoque fuselage and all-metal construction. With a Continental engine of 65 h.p. the more important performance figures are:—Max. speed, 115 m.p.h.; cruising speed, 104; landing speed, 37 m.p.h.; weight empty, 650 lb.; all-up weight, 1,200 lb.; and range, 350 miles. No price or delivery details have yet been arranged.

Free Breakfasts at Shoreham

MORE than sixty breakfasts were won, lost and consumed at Shoreham on August 6, when the South Coast Flying Club held a dawn patrol. Only two men got through the Shoreham defences, Mr. H. Whittaker and Mr. J. D. Parker, both of Redhill.

Mr. Whittaker is an instructor, but he uses a Miles Martlet for dawn patrolling. He is proud of his season's record of five patrols and five free meals. His breakfast-collecting technique, he says, consists of approaching at 2,000ft., and as soon as he sees anyone chasing him he half-rolls in the appropriate direction and dives out. With the Martlet he always seems to get away.

Weather in London was poor—ten-tenths at 1,000ft. with half mile visibility. Luckily three Swallows got away from Hanworth before Croydon 'phoned through to say that Q.B.I. was on and that machines should stay on the ground. The weather lifted just beyond the Dorking Gap, and Shoreham was enjoying a perfect summer morning. We approached at 2,000ft., and three of the red and black Moths promptly got on to us. One cannot successfully dive a Swallow away from a Moth, so we, amongst the very many other unlucky ones, were booked straight away.

Nine machines were holding the fort, and most efficiently they did it. There were five Moths from the Shoreham Club, two Tigers and a Leopard from Brooklands and one Moth from S.C.F.C.'s subsidiary aerodrome at Storrington.

LATVIAN EFFICIENCY

The V.E.F. J.12 in the Air : 140 m.p.h. on 90 h.p. : Control in Excelsis

DURING the last year or so a little low-wing monoplane of exceptionally clean design has been seen about quite a lot at Croydon and elsewhere. This machine, which is, at present, the one and only type of aeroplane produced in Latvia, is the J.12, built by the State-controlled aircraft section of Valsts Elektrotechniska Fabrina, a firm which specialised in the manufacture of precision apparatus of various kinds. Since Latvia is a timber-growing country it might be expected that the J.12 is of all-wood construction. Its predecessor, the J.11, first appeared in 1936, and the J.12 is a considerably cleaned up and strengthened version designed for fast, economical private transport and aerobatic work.

Certainly, it is quite one of the cleanest machines in the smaller class—a fact which is obvious from the performance figures on the mere 90 h.p. of a Cirrus Minor engine. Nowhere on the machine can a joint be seen, and both wings and fin are perfectly faired into the fuselage. The construction is quite simple and orthodox, with the wing in three sections, of which the centre-section is virtually part of the fuselage structure. There is one main box spar and one auxiliary spar and the wing is entirely ply-covered. The fuselage is a box structure with a strut-braced tailplane intentionally mounted rather high above the fuselage in order to obtain good stalling and normal spinning characteristics. The two legs of the undercarriage are cantilever and, perhaps, even too effectively faired in from the mud and maintenance points of view.

V.E.F. J.12
90 h.p. Cirrus Minor engine

Span	30ft. 6in.
Length	23ft. 8in.
Wing area	122 sq. ft.
Weight empty	1,012 lb.
All-up weight	1,500 lb.
Wing loading	12.3 lb./sq. ft.
Power loading	16.7 lb./h.p.
Maximum speed	148 m.p.h.
Cruising speed	124 m.p.h.
Landing speed	47 m.p.h.
Endurance at cruising speed	4 hours.
Price	£750
Concessionaires :	D.R.P. Engines, Ltd., Gatwick Airport, Horley, Surrey.

"*Flight*" photograph.

The transparent enclosure arrangement on the J.12. The rear portion slides and can be left in any position, while that over the front seat lifts. There is a wide luggage locker behind the rear seat.

The ailerons are of the slotted type and these are the most delightful feature of the J.12 treated as a flying machine. Not only are they light at all speeds, but their reactions are so instantaneous that the wing, so to speak, just follows the control column. At the same time they are fully effective down to the stall, which does not arrive too suddenly. In fact, the machine can be flown indefinitely at practically stalling speed and only when the column is eased firmly right back does the true stall occur, with the usual reactions.

Immediately inboard of the ailerons are the flaps, which extend on each side of the centre section. These are also slotted and, while being extremely effective at comparativly high speeds, do not cause so much drag at lower speeds that the landing process is unduly abbreviated. There is quite a perceptible floating period after checking slowly from the normal gliding speed of 100 km/h (62 m.p.h.). Furthermore, the effect of these flaps when first applied is to push the nose down, and, left to itself, the machine takes up a more or less correct gliding angle. They are directly operated by means of a lever on the

The clean lines of the V.E.F. are obvious in this photograph, taken during the Isle of Man races. The ailerons do not, as they appear, extend from centre section to wing tip—the inner portions are slotted flaps.

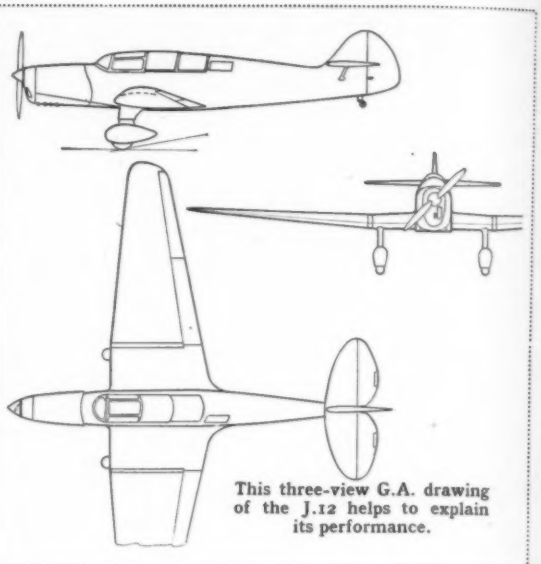
left of the pilot's cockpit, and can be left in half a dozen different positions, the first one (giving 10 degrees or so) being used for take-off.

Provided that such a readjustment is not made at the last moment, it is quite practicable to use the flaps as a means of shortening or stretching the glide. The best way of making an approach seems to be to come in on the usual right-angle course with the flaps in the half-down position, using the remaining movement to kill any excess height as the boundary is about to be crossed. By way of further adjustment the J.12 will sideslip quite satisfactorily so long as the slip is not allowed to become too steep.

With an aerobatic harness which tended to slip off the shoulders and an old gentlemanly dislike of aerobatics on a strange machine, I was satisfied to use the aileron control only for steep turns, but it was sufficiently educative to change bank several times through 180 degrees, and to make one straightforward, wide radius loop. The aileron control is such that one tends to progress in a series of quarter-rolls just for the pleasure of using it. The machine which is at present over here has its instruments calibrated in the metric system—as well as a fuel tap, controlling the feed from the two tanks, marked with letters which require considerable concentration if it is not to be turned to the " off " position by accident. When I flew it the revolution counter was out of action, but, with the throttle set at a position halfway through its quadrant, the J.12 flew level at an indicated speed of 220 km/h.

This, with adjustment for height, works out at 139 m.p.h. The engine revolutions may have been higher than I thought, or the instrument might have suffered from position error. An up-and-downwind trip of 151 miles—including some three or four minutes of slow-flying tests—was made, take-off to landing, in 1 hr. 15 min. Allowing (ungenerously or not) a total of five minutes for the take-off, landing, circuits, and stall experimentation, and forgetting the adverse all-in effect of the wind on the two legs, this gives an average speed of exactly 130 m.p.h.

The wing-loading is not unusually high, the landing speed does not seem to be much higher than 45 m.p.h., and the flaps more than take the edge off the approach—but such a performance is not obtainable without some sacrifice. In this case the sacrifices are in forward view and length of take-off run. The latter is not excessive when the flaps are used, but some distance is covered before the machine is really under way and climbing satisfactorily. Without an r.p.m. indicator it is impossible to judge such things, but I felt that I would not be ready to lose 5 m.p.h. in the cruising speed to obtain a little more urge during the crucial stages of the take-off. Possibly a metal airscrew would make that little difference.



This three-view G.A. drawing of the J.12 helps to explain its performance.

In our crowded skies, the view question is rather more serious, but there is no reason at all why the J.12 should not be laid out in open two-seater form, with carefully designed individual screens. The transparent cabin-top idea clears the lines very much and makes it a very comfortable and quiet aeroplane—but, again, I will lose another 5 m.p.h. to be able to see straight ahead. Theoretically this should be possible with the enclosure, but, in fact, the effects of perspective and distortion make the forward view almost worthless. I met a squadron of Wellingtons on their way back from Paris and flying at my own height, so perhaps I am biassed.

These two points can possibly be rectified, but certainly mar the near perfection of the J.12 as a flying machine. In the circumstances the rectification would be well worth while. There is no other machine in its class and available in this country with quite the same characteristics.

H. A. T.

THE HANWORTH PARTY

THOUGH Sunday, August 6, was an awkward day for the London Air Park Flying Club's garden party, it was, since C.A.G. training may not be interrupted, the only possible one in the year. All the same, for a small display it was one of the best. No waiting, no delays, every event on time, and a pleasant hotel nearby when wearied of aviation.

When we write the words " every event on time " we are fully prepared for a shriek of disbelief from the regular flying display people—but no other display is blessed with an organiser like Jimmie Rush. During the previous week every question about the party had been answered in the same way—" Ask Jimmie—he's looking after that." Mr. Rush (with Mr. Castlemaine) was on the microphone, Mr. Rush demonstrated the Sparrowhawk, Mr. Rush arranged for the band of the 1st King's Dragoon Guards, Mr. Rush arranged the stalls (there was a minature fairground on the lawn), Mr. Rush got the programme out, Mr. Rush . . . you have the idea.

The only disappointment was the non-appearance of Herr Franz Lehmann who was to have aerobated a Bücker Jungmann. Unfortunately he was, we believe, forced down at Dijon by weather. His place in the programme was taken by a demonstration of the Chilton by the Hon. A. W. H. Dalrymple, the winner of the previous day's Folkestone Trophy race at Lympne.

Mr. Carter, of Cambridge, in a Moth Minor, won the arrival competition and went home with a silver table lighter presented by Sir Charles Wrench, who keeps his Gipsy Moth at Hanworth. Air Cdre Chamier and Mrs. Chamier were flown over from Farnborough and duly inspected the Civil Air Guard and the 94th Squadron of Air Cadets.

After that the finals of the A.E.M. trophy for " A " pilots was held. The four finalists were Messrs. G. Cameron, J. Stonley, D. W. Allen, and J. D. Randall. Mr. Cameron won, though Mr. Randall asserted that he would have won but for the fact that the judges moved the landing circle and the aerodrome nameplate just as he was touching down. A bomb-dropping competition for instructors was won by Mr. Reid, who also carried off the prize for the balloon bursting. Score—two bottles of whisky, one of which found its way later into Mr. Cameron's cup. Unfortunately, the control officer, Flt. Lt. Harston, failed to control the bombing when the Air Attache of Ruthenia arrived to inspect the new aircraft types. We regret to say that the Air Attache—with sunshade—suffered somewhat.

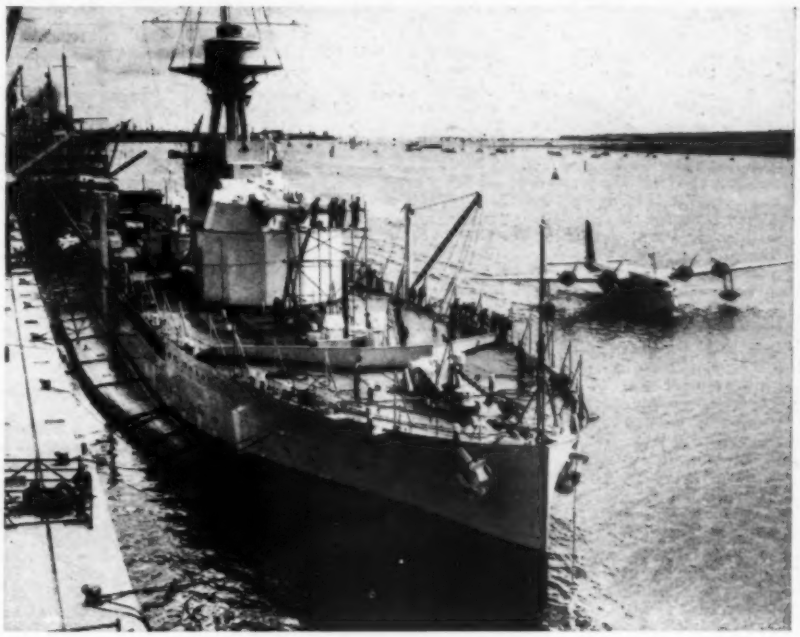
Machines demonstrated were the G.A. Cygnet, a Tipsy by Mr. Brian Allen, a Sparrowhawk by Mr. Rush and a Wicko by Mr. G. W. Wikner. Mr. Benno de Greeuw made a parachute drop from 1,500 feet and landed within about two yards of the crowds. The flying ended with a fly-past by instructors, led by Mr. Kearney, and including a somewhat startling Prince of Wales Feathers in front of the stand. Mrs. Chamier presented the prizes.

Liaison in France

BECAUSE the French are both logical and practical, military and commercial aviation are not segregated in watertight compartments and so developed along completely independent lines. Whenever new types of aircraft are evolved, their qualities are considered first from the military, and then from the commercial standpoint.

Even in propaganda this liaison is maintained, and an example is the French Air Ministry's recruiting train which has just set out on a three months' tour of France. Although the main object of this travelling exhibition is to attract recruits to the *Armée de l'Air*, there is an interesting commercial section on board, furnished and run by Air France. Models of machines used by the company are on show and pilots are there to lecture to all and sundry. Imperial Airways ran a somewhat similar mobile display a year or two ago.

COMMERCIAL AVIATION



BACK FROM AMERICA: *Caribou*, one of the two strengthened "C" class boats being used for the Atlantic mail services, taxies up to its berth at Southampton after the first two-way crossing. On the left is the monitor *Erebus*, in for a refit before going to South Africa.

THE WEEK AT CROYDON

"A. Viator" Talks About Lost Luggage, Air Sickness and the Black-out in the Course of his Transport Commentary

AIR traffic managers admire the way in which railway folk lose two vans of luggage and fruit, for if an air passenger even loses a little hand baggage (which is not the company's responsibility) he howls the roof off the main hall at Croydon—which, incidentally, has never been properly fastened on, to judge from the amount of rain that comes in. Air companies, too, are accustomed to regard anything labelled fruit as urgent and perishable, and not to allow it to simmer for weeks in unknown sequestered nooks.

Finally, one cannot but admire any organisation which relies on the odd bright boy, or acting shunter's mate, to discover missing vans of vital importance and rewards him with a five-pound note. In air circles everyone, from the manager downwards, receives a kick in the pants if the smallest parcel goes astray, and the finder probably gets two for not discovering it earlier.

Curt comment from an air transport man was that once you get your stuff firmly fixed on a pair of rails and pointing the right way it should be fairly simple, but railwaymen indignantly deny this and point out proudly that they quite often lose whole trains.

Mr. William C. Bullitt behaves rather like a bullet in his use of air transport. It seems to him quite normal travel to come across from Paris (where he is U.S. Ambassador) to Croydon to put his 17-year-old daughter on the Irish Sea Airways' machine for Dublin and the Horse Show, and then, after a brief stay, to return to Paris. He and his daughter crossed to England by Imperial Airways and he returned after an hour by Air France. That is the "air spirit," and one is glad to see it in so highly placed an official as an Ambassador.

I see that an American air line chief has said that only 1 per cent. of air passengers are sick. That is also the European experience of any company with 'up-to-the-minute aircraft, and it is only the old low-flying potwallopers which make people ill—or short-stretch flights between neighbouring towns, where adequate height cannot be gained in the time. Certain types of weather give nasty bumps, however, during the approach to land, and, to a lesser degree, during the take-off.

Amongst that 1 per cent., however, must be reckoned sundry backwoodsmen who have not flown before and have the twitters—as well, of course, as the good old hearties who have been to good old parties the night before and whose internal economy is equivalent to that of Stromboli immediately before an eruption. So that, knowing the fallibility of human nature in the matter of failing to become a seasoned air traveller at an early age, and also in the matter of parties, the 1 per cent. probably becomes only ½ per cent. in the matter of genuine internal troubles.

A bit of news (in the midst of a lot of sensational nonsense) the newspapers missed about the black-out was that, in order to co-operate with the authorities, two foreign companies put themselves to the inconvenience of altering their night-flying freight schedules so as not to land during the period between 12 midnight and 4 a.m. These were Sabena and K.L.M., the night freighter of the latter being due in at 1.30 a.m. and out again at 5 a.m. On this occasion it came in at about 4.15 a.m. and departed again at 5 a.m. But, bless you, there is no thrill in that calculated to make your breakfast bacon quiver on your fork.

Black-Out Libels

There is no other news about the black-out except that the suspicious character which the police were chasing, whose hat was pulled well over his eyes and who carried a dangerous-looking parcel under his arm, turned out to be the night watchman of a company on the airport. As for the story of the air company's publicity chief who refused to hide his light under a bushel and was all lit up during the black-out, and who, moreover, insisted on blowing his own trumpet (which sounded as irritating as an air-raid warning)—it is a dastardly slur on a modest body of men.

One of last week's prize headlines in a newspaper, which apparently 'phoned Sir John Reith in America, was as follows: "Sir John Reith says Whitehall bars solution of Airways crisis. . . ." I am surprised at Sir John, but for my part I have always believed bars to be the solution of most crises. Keep an Air Ministry official in a Whitehall bar long enough and he will become quite human, if not super-human—but I must not in this place tell the story of the department chief who, in the "Bottled Badger," swung by his heels from the roof beams because things were in a mess and he could weep about it more easily upside down.

A. VIATOR.

THE FIRST BRITISH CROSSINGS

"Caribou" Makes the Return Trip and "Cabot" Reaches New York

ON Saturday, August 5, the Short *Caribou* left Southampton at 2.13 p.m. for Foynes on the first stage of the initial British Atlantic mail flight. On the previous Wednesday Capt. J. C. Kelly Rogers, who was in charge of the machine, took it for a thirteen-hour test flight, during which *Caribou* travelled about 2,000 miles.

At Foynes on Saturday afternoon, the machine left the Shannon after being refuelled to the maximum normal all-up weight, and she then received a "top up" from a Harrow flown by Flt.-Lt. Tyson, the chief pilot of Flight Refuelling, who is stationed at Rynanna for the period of the experimental mail services. All went well with the refuelling arrangements, though at one moment the hose-nozzle was pulled out of its receiving cup in the *Caribou*. Some sixteen minutes were spent in the refuelling process.

Among the watchers at Foynes were Mr. De Valera, the Prime Minister of Eire, and several Government officials, as well as a party which had been flown over in *Maia*. This machine, which left Southampton shortly before *Caribou*, brought over Air Marshal Sir J. Salmond, a director of Imperial Airways, Sir Francis Shelmerdine, the Director General of Civil Aviation, Mr. W. L. Runciman, a director of Imperial Airways, Mr. J. Dulanty, the Eire High Commissioner in London, and Capt. A. S. Wilcockson, manager of the Imperial Airways' Atlantic division. Sir Francis Shelmerdine, Mr. Runciman, and Capt. Wilcockson returned to Southampton in the Pan-American Boeing *American Clipper* which was making its maiden voyage.

When *Caribou* left Foynes, 1,055 lb. of mail was being carried, though this did not represent the limit of the payload. The crew consisted of Capt. J. C. Kelly Rogers (in command), Capt. S. G. Long (chief officer), Mr. B. C. Frost (first officer), and Messrs. A. J. Coster and C. S. Wilcockson (wireless officers). Mr. Coster was the only member of the crew who had previously made an Atlantic crossing. He flew with Capt. Bennett in *Mercury* last year, and shortly before this initial flight of *Caribou* he was appointed divisional radio superintendent of the Atlantic division.

The crossing from Foynes to Botwood took rather longer than was expected—actually about 19½ hours. Apparently the weather was reasonably good until approaching Newfoundland, when the machine ran into the usual fog banks; the drizzle which had persisted over the second half of the journey became heavy rain, and the wind-strength increased. *Caribou* had been previously averaging a ground speed of 118 m.p.h., but over the last part of the journey this was reduced to 105 m.p.h.

The machine landed at Botwood at 2.30 p.m. (B.S.T.). Very shortly afterwards Capt. Kelly Rogers took off again for Montreal, which was reached by 11.10 p.m. (B.S.T.)—three hours behind schedule. *Caribou* only remained in the St. Lawrence River for a little less than an hour, and left at 12.6 a.m. (B.S.T.) on the final stage of the flight to New York. Among those to greet the crew at Montreal was Mr. G. D. Howe, the Canadian Minister of Transport.

As a result of the delay, New York was reached after dark and Capt. Kelly Rogers, who had never been to New York before, had to undertake the somewhat difficult task of landing on strange water in the dark and under an overcast sky. Before making his final approach full instructions were sent by radio from the Port Washington base, where white and red lights marked the beginning and end respectively of the alighting area, a string of white lights marked its boundaries, and a searchlight illuminated the runway. The landing was uneventful; 960 lb. of mail were carried between Montreal and New York.

Back Again

Because of litigation concerning the accident to *Cavalier*, there was a chance, it appeared, that *Caribou* might be impounded while at New York, but, in fact, the machine left according to schedule at 4.9 p.m. (B.S.T.) on August 9, arriving at Montreal at 7.25 p.m. (B.S.T.). The boat left Montreal on the following morning, August 10, and left Botwood at about midnight. The crossing, by way of a contrast to the westward journey, took only 12 hr. 5 min., and the whole distance from New York was covered in an actual flying time of a little short of twenty-two hours. With favourable conditions and smooth water for the take-off, *Caribou* was not refuelled in the air at Botwood for the return journey. Even at Foynes no more fuel was taken aboard for the rest of the journey to Southampton.

As a matter of interest it may be said that at one period during last week three machines were crossing the Atlantic on regular services, carrying a total of 31 passengers. Not only was *Caribou* on her return flight, but the new *American Clipper* was flying across from Foynes to Botwood, and *Yankee Clipper* was on its way across to Marseilles.

Last Saturday the second boat, *Cabot*, in charge of Capt. D. C. T. Bennett, left Southampton for the second of the regular crossings at 1.55 p.m., was refuelled in the air at Foynes that afternoon, and reached Botwood after a 16½-hour flight. An hour later Capt. Bennett took off for Montreal, leaving again at 8.55 p.m. (B.S.T.) on Sunday for New York. *Cabot* reached Port Washington at 11.15 p.m. (B.S.T.). The other members of the crew were: Capt. A. C. Loraine (chief officer), T. N. Farnsworth (first officer), R. Martin and C. L. Cheesman (radio operator).

A Pan-American Loss

AT the time of going to press very little information is available about the accident to a Pan-American Airways flying-boat, presumably a Sikorsky S.42, which crashed in the bay at Rio de Janeiro. Only two of the sixteen persons aboard were rescued. According to the only available report, the machine struck an object on the water when touching down, swerved, collided with a dry dock, and caught fire before finally sinking.

Lucky Enough

WHILE on the Heston-Zurich run on Friday, a British Airways Lockheed Fourteen caught fire in the air and had to be forced-landed on an emergency field near Luxeuil, some sixty-seven miles from Basle.

It seemed that a leak was experienced from a fuel lead to the port engine while flying at the normal 10,000 ft. and when the machine had come down to about 3,000 ft. the engine caught fire—possibly following the usual flaming backfire which accompanies the act of throttling back. Cdr. David Prowse pushed the machine down in a steep dive and was lucky in being able to pull off a crash-landing without injury to the nine passengers. As soon as it was down and passengers and crew were out, however, the whole machine went up in flames and was completely destroyed. Knowing something of the Fourteen, which cannot easily be put down at short notice—least of all in a small space—we must certainly congratulate the pilot. Presumably the fire-extinguishing equipments, though used, failed to deal with the outbreak, which must have been very serious from the start.

And Yet Another

ONE of Imperial Airways' new strengthened "C" class boats, *Australia*, badly damaged its hull at Basra on Wednesday of last week. The machine was taking off and, apparently because one or more of the engines did not give full power, the hull touched the bank of the river when the machine was almost, if not quite, airborne. Nobody was hurt, but the machine will not be in service again for at least a month. *Australia* is one of the three boats which are to be used on the Tasman Sea service but which has, owing to fleet shortage, been flying on the normal Empire routes.

South American Postponement

THE fact that the proposed air service between this country and Buenos Aires is not likely to be started before 1943 has resulted in a joint protest to the Air Ministry from members of British firms in the Argentine. It was originally announced that the first flights, using landplanes, would be made towards the end of this year, and the considerable postponement, therefore, came as a distinct surprise to those business houses which are likely to make use of a British air mail service to the Argentine.

Representatives of Anglo-Argentine interests in London have associated themselves with the protest, and point out that for reasons both of prestige and of improvement in the air-mail facilities, a British service using American machines would be much better than no service at all. More than £100,000 is paid annually by the Post Office to Air France and Deutsche Lufthansa, and the present charges are considered to be both expensive and anomalous.

An Imperial Dilemma

THE whole matter of last week's announcement by Imperial Airways concerning the curtailment of passenger accommodation on the Empire routes is fully discussed in the editorial columns, and it suffices here to give merely a brief outline of the official statement.

The reasons they give are, first, the effect of the armament programme, which has made the incipient fleet shortage even more marked; second, the considerable shortage in trained personnel—also because of the requirements of the Royal Air Force; thirdly, "a singularly unfortunate series of losses" in the Imperial fleet; and, fourthly, the marked increase in the weight of mail which is now being carried. A subsidiary factor has been the decision to carry greater reserves of fuel, and, consequently, a smaller payload, over certain sections of the Empire routes.

During the first six months of 1938 Imperial Airways was called upon to carry 1,400,000 lb. of mail, while during the first six months of this year the figure was 2,116,000 lb.—an increase of about 50 per cent. The company explains that in order to rectify the present position it may be necessary to "look elsewhere"—in other words, to buy American machines. They have already ordered forty-eight Wright Cyclone engines to be fitted to eight of the Ensign fleet. These engines, however, will not be delivered until the end of the year. It is pointed out that the purchase of foreign machines is being considered only in order to meet immediate and urgent needs.

In the matter of detailed equipment, the statement mentions that orders have been placed for complete sets of air-screw slinger rings and that Goodrich de-icers have been specified for the new land machines on order, while these same de-icers are being considered for use on various units of the existing fleet. At the same time they are "perfecting the carburetter heating on their engines."

In order to deal with the problem of personnel shortage, plans are already in hand for developing a joint British Airways and Imperial Airways school for pilots, navigators, engineers and radio operators.

The final sentence in the statement may or may not be illuminating. It is to the effect that "Imperial Airways have made known to the Air Ministry their urgent fleet requirements. They now await the Air Ministry's decision."

Although the typed statement only mentioned "curtailment" of passenger accommodation, it was clearly stated by word of mouth that this curtailment would involve the refusal of practically all new bookings for the Empire services.

JUST A FEW . . . : At the entrance to the new Birmingham airport at Elmdon is a signpost intended to be taken seriously by air travellers rather than by motorists. It was presented by Norman and Dawbarn, the architects, and shows the crow-flying distances, in kilometres as well as miles, to places as far apart as Manchester, Oslo and Lisbon.

SURVEY LESSONS

Some Impressions of the Indian Ocean Reserve Route

CAPT. P. G. TAYLOR, the Australian pilot who was associated with the late Sir Charles Kingsford-Smith in many of his different flights, and leader of the recent survey of the Indian Ocean air-route in the Consolidated boat *Guba*, will report to the British and Australian Governments, who financed the flight, that the route is entirely suitable for an air service with large flying-boats. He has recently returned to Australia.

According to an Australian correspondent, it is Capt. Taylor's belief that some day the trans-Indian Ocean route will become the most popular for passengers, and that it might reasonably become part of the main Empire route, though it was intended only as a reserve.

He says that the islands, all British territory, at which the *Guba* stopped on her 5,000-mile flight from Port Hedland (Western Australia) to Mombasa (Africa), were confirmed to have natural flying-boat bases in their lagoons. He points out also that the route is generally fair-weather, having the fortune to be in latitudes which miss most of the bad weather of both seasons.

On the survey, the *Guba* ran into heavy cloud which obscured the stars for some hundreds of miles between Western Australia and the first scheduled stop at the Cocos Islands, and the difficulties of navigation and fuel shortage forced him to cut across to Batavia. The rest of the journey was accomplished in good weather, occasionally in cloud, but with long stages of still, clear air when there were good stars or a bright sun, and navigation was not difficult. The crew were never in any great difficulties, and even the Cocos diversion Capt. Taylor believes to have been a good thing. He says: "It will probably serve as an example of the possibilities of flight over this and similar routes, and of the absolute necessity for adequate aids to navigation when aircraft fly regularly over this route."

To avoid any such repetition, he suggests the strengthening of meteorological facilities, pointing out that it was not possible in the one crossing to obtain complete upper-air information. What was gained, however, was a fairly comprehensive knowledge of wind-force and direction and its variation with altitude, and this will almost certainly have a favourable bearing on fuel loads required by machines making regular crossings.

The landing facilities, Capt. Taylor found, were almost ideal, and information gained on them by the survey will enable the bases to be put in a state in which they can be used regularly and at short notice. Sites for landing grounds, much better than were anticipated, were found at certain islands, and a natural substance for laying down runways was also found. All the bases were examined from the air and photographed, and Capt. Taylor's view is that the cost of their preparation for a regular service will be relatively low.

On a regular service the stops would probably be Seychelles, Diego, Garcia, Cocos Islands, and then Australia. People reaching these islands will, according to the official correspondent on the flight, Mr. J. Percival, find them beautiful yet simple, and the islanders themselves charming. On Diego Garcia there are only three white men, and so isolated was their coral atoll that they did not know the Great War had been declared until the *Emden* steamed into the harbour. Now, whenever a naval ship approaches, they wonder whether another war has started. On Cocos Island, the *Guba's* crew thoroughly enjoyed their stay amongst the Utopian inhabitants and members of the staff of Cable and Wireless. The inhabitants pay no taxes, and every man of twenty years receives a minimum wage, orphans are maintained by the Governor until they reach working age, and the aged receive a pension of half salary. Seychelles offered the crew much the same impression of an island paradise.

The crew, who have now gone their own ways, have not much, however, to say about their actual flying experiences. The flight they found comfortable and uneventful, except for the Cocos Island incident at the beginning of the trip, and little else in the way of comment was offered.

FROM the CLUBS and SCHOOLS

THANET.
FAIRLY good weather resulted in 151 hr. being flown during the week ended August 7. Mr. E. Church made his first solo flight.

LINCOLNSHIRE.
A total of 114 hr. was recorded during the week ended August 13. Messrs. W. A. C. Browne and C. H. Cole went solo.

OXFORD.
Many new members have been enrolled and the first pupil to go solo was Miss B. M. Nicklin. Flying time for the week ended August 12 amounted to 62 hr.

WESTON.
Members are enthusiastic over the new Piper Cubs and in spite of bad weather 131 hr. were flown. Mr. T. B. Colman has gone solo for the first time.

STRATHTAY.
During July a total of 160 hr. was recorded. For the first week in August 58 hr. were flown. Messrs. Kidd, McBarnett, Bruce, Dickson, Downie, Robertson, Laird and Lockhart went solo.

WITNEY AND OXFORD.
During the week ended August 12, 71 hr. were flown. Messrs. R. Bell-Walker, V. Davies and R. A. Harris went solo. A fifth Swallow has been added to the club fleet.

BEDFORD.
A formation cross-country flight was carried out by C.A.G. members. Messrs. J. H. R. Ratcliffe, R. J. Allen and C. H. Etheridge went solo.

YAPTON.
Since the beginning of August 74½ hr. have been recorded by club and C.A.G. members. Thirty-seven members are now flying solo and several others are now ready to commence.

PORTSMOUTH.
Club and C.A.G. members have logged 107 hr. 15 min. during the first fortnight of August. Sixty-four members of the C.A.G. section are now flying solo.

MARSHALLS'.
During the week ended August 12 a total of 145 hr. 30 min. was recorded. Messrs. N. A. Gillham and J. Shuckburgh have gone solo.

HORTON KIRBY.
For the week ended August 10, 153 hr. 15 min. were flown. First solo flights were made by Miss J. Akhurst and Messrs. L. W. Poague, C. Racine and S. R. Jackson. The total flying time for July was 743 hr. 15 min.

EXETER.
In spite of occasional showers 152 hr. were flown during the week ended August 7. Messrs. K. R. Collins, A. H. Portch, J. Collins, L. H. King, A. H. Blackie and F. A. Parkhouse made their first solo flights.

IPSWICH.
Flying members have greatly increased since the introduction of the new Piper Cub and 138 hr. flying time was recorded during the week ended August 7. Miss Ferguson and Mr. L. R. Foote have gone solo.

PLYMOUTH.
The great improvement in the weather is reflected in the 116 hr. flown during the week ended August 7. Messrs. B. K. Allen, H. Heathcote and G. W. Stephens have gone solo. On July 30 a treasure hunt in cars followed by sports was held.

INVERNESS.
For 3½ days during the week ended August 7 no flying was possible. In spite of this 26 hr. were recorded for the week. Messrs. E. Hughes and J. Fraser-MacKenzie made their first solo flights. A new Piper Cub has arrived and will be used for solo flying.

WEST SUFFOLK.
Flying time for the week ended August 13 amounted to 45 hr. Messrs. F Bradman, O. A. Reeve, W. Smyth and V. M. Waugh have joined the club as new members and in the C.A.G. section, Lady Mary Kirk and Mr. J. O. Wiggin.

SOUTH COAST.
A successful "dawn patrol" was held on Sunday last, 30 aircraft taking part, but only two were successful in winning free breakfast. Messrs. J. S. Townsend and E. L. Milnes, C.A.G. members went solo.

HANWORTH.
Total flying time for the C.A.G. and club members amounted to 128 hr. Miss U. Spicer and Messrs. L. Collins, H. Smith, C. Login, E. Jones, N. Shuttleworth, A. Golay, G. Hincks and S. Mays went solo.

REDHILL.
Flying time for the week ended August 12 was 174 hr. 20 min. Miss L. Hamilton and Messrs. A. E. W. Brown, J. H. Saker, D. A. Young, H. P. Wiseman, J. L. Cribb, G. E. Chugg, H. J. Wilkinson, A. P. Osland and C. M. Davis went solo.

LONDON.
A total of 128 hr. 35 min. was flown in the week ended August 12. Messrs. W. J. Sanderson, A. N. S. Johnston, P. Jackson, R. C. Webster, G. Viola, K. M. Donald-Mills and J. Stirling made their first solo flights. Messrs. A. H. Clement and I. L. Carr joined the club as new members.

BRISTOL AND WESSEX.
Ninety hours fifteen minutes' flying time was recorded for the week ended August 11. Messrs. A. J. Smith, C. C. Shackleton, J. H. W. Wood, M. F. Andrews, A. N. Ewing and A. J. Summer have gone solo. The second of three Moth Minors has been delivered.

CINQUE PORTS.
After a week of very mixed weather flying time totalled 65 hr. First solos were completed by Messrs. Stephens and Mr. Vertigen, the former a member of the C.A.G. Preparations are now going ahead for the Cinque Ports Wakefield Cup Race which is to be held on September 16.

BROOKLANDS.
Flying time for the week ended August 12 amounted to 130 hr. Messrs. Dyson Taylor, H. Lea and G. Melitis made their first solo flights. Mrs. Dumont, Admiral Triggs, Messrs. H. B. Roberts, Donald A. Dale, Smart and Berry have joined as new members. Brooklands successfully defended Shoreham in a "dawn patrol," only two attacking machines managed to get through.

OVERSEAS.

KARACHI.
Flying time for the month of July amounted to 88 hr. 10 min. Capt. B. S. Leete paid a visit to Karachi during the early part of this month to see the working of the Link Trainer.

RAND.
Flying time for the month of July amounted to 156 hr. 32 min., while the Benoni section logged 31 hr. Adverse weather conditions seriously curtailed all flying.

CAWNPORE.
The total flying time for July amounted to 96 hr. 30 min. Mr. G. B. Mehta carried out his night flying course for 6 hr. 40 min. Mr. S. K. Dube flew the Moth to Lucknow and back on two occasions.

MADRAS.
During July a total of 84 hr. 35 min. was recorded. Mr. Pillai made a 600-mile flight to Coimbatore and back with the instructor. At the close of the month a flying meeting was held at Pondicherry as a farewell to a club member Monsieur Vincens. Mr. Bhore went solo after a total of 3½ hr. tuition.

Still One of the Best

"Learning to Fly," by F. A. Swoffer; 7s. 6d., Pitmans.

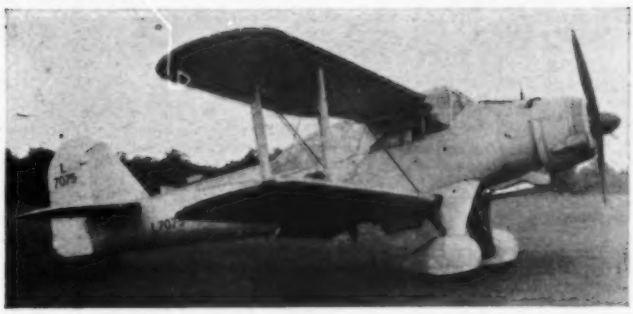
LONG ago, in 1929, Flt. Lt. Swoffer wrote a book on elementary flying training which, at the time, was quite one of the best and clearest. This book has been through several editions, the last appearing in 1936, and it has now reached its fifth. In the meantime a number of other somewhat similar books has been published, but this one still remains as an excellent example. In any case, as the author explains, the principles of flying training have remained much the same during the last ten years.

Since the last edition was published, Flt. Lt. Swoffer has added a short chapter on instrument flying, and has brought the rest of the book up to date in various minor details. Such often vaguely-referred-to items as those relating to millibar correction and compass errors are explained, though we have yet to come across a really good explanation of the northerly turning error. Once again this has been somewhat ruthlessly skated over.

For those who are comparatively new to flying, it might be mentioned that Flt. Lt. Swoffer was instructor both at the London Aeroplane Club and at the Hampshire Aeroplane Club before going to East Africa to join Wilson Airways in 1929. Afterwards he went out to China, and he is now the manager of Guernsey airport.

SERVICE AVIATION

Royal Air Force and Official Announcements : Fleet Air Arm News : Military Aviation Abroad



FOR F.A.A. RE-EQUIPMENT : The Fairey Albacore (Bristol Taurus) some notes on which appear below, showing the flaps depressed.

Albacore Data

THE Fairey Albacore, first pictures of which appeared in *Flight* last week, is described by its manufacturers as a three-seater, dive-bomber, reconnaissance-torpedo-carrier biplane. As a shipplane with wheel undercarriage it has the following dimensions: Span, 50ft.; length, 39ft. 10in.; height, 14ft. 2¼in., while as a seaplane the length is increased to 42ft. 5¼in. and the height to 15ft. 3¼in. It will be gathered from a comparison of the photograph appearing on this page and those published last week that the shape of the cowling has been altered and that there are certain other detail refinements. Flaps are fitted on the bottom wing, though in view of the fact that the machine is a biplane with fixed undercarriage it should not be necessary to use such devices to limit the speed in a bombing dive. The prototype illustrated last week was fitted with a Rotol airscrew whereas the machine shown above has a De Havilland constant-speed type. Metal monocoque construction is used for the fuselage but the wings are fabric-covered.

Flying Accidents

THE Air Ministry regrets to announce the following flying accidents:—

P/O. Peter Phillips lost his life and P/O. John Frederick Pettigrew was seriously injured as the result of an accident which occurred at Goring-on-Thames on August 4 to a Royal Air Force aircraft. P/O. Phillips was the pilot of the aircraft and P/O. Pettigrew the only other occupant.

Sgt. Harry Donald Perry Farrow, A/Sgt. Alfred John Williams Sargeant and A/C.2 Leslie Phillips and a woman civilian, lost their lives as the result of an accident which occurred on August 7 at Beachy Head to an aircraft of No. 107 Squadron. Sgt. Farrow was the pilot, and A/Sgt. Sergeant and A/C.2 Phillips were the other members of the crew.

Sgt. Ronald Jefferies Williams lost his life as the result of an accident which occurred near Nottingham on August 6 to an aircraft of 103 Squadron. Sqn. Ldr. John Coverdale, the pilot of the aircraft, and A/C.2 Peter Ivo Bligh, the other member of the crew, were not injured.

Sgt. Leonard Clune Steed and A/C.1 William Halliburton Scott lost their lives and A/C.1 Alfred Albert Shaw was seriously injured in an accident which occurred at Aboukir, Egypt, on August 8, to an aircraft of No. 203 Squadron. The other occupants of the aircraft, Sqn. Ldr. James Rowland Scarlett-Streatfield, P/O. Peter Roland Mathews Williams, Cpl. Philip Ingrey, Cpl. John Riddell Smith, A/C.1 William Nixon Arrowsmith and A/C.1 William Hetherington Ard were slightly injured.

A/C.1 Alfred Albert Shaw died in the Ras El Tin Military Hospital, Alexandria, on August 10 as the result of injuries received in the accident.

Flt. Sgt. Edward James Bruce Russell Gillespie, Sgt. David John Wood, A/C.1 Philip Henry Cook and A/C.1 Thomas William Clarkson lost their lives and A/C.1 William McGlen Stewart Harkness was slightly injured in an accident which occurred at Linton-on-Ouse on August 8, to an aircraft of No. 58 Squadron. Flt. Sgt. Gillespie was the pilot of the aircraft and Sgt. Wood and A/Cs. Cook, Clarkson and Harkness were the other members of the crew.

Wing Cdr. Burton Ankers, Cpl. Robert Samuel Gilbert and A/C.1 Arthur Reginald Harris, lost their lives as the result of an accident which occurred at Kutumba, India, on August 9 to an aircraft of No. 39 Squadron. Wing Cdr. Ankers was the pilot of the aircrait and Cpl. Gilbert and A/C.1 Harris were members of the crew. The other occupants of the aircraft, A/C.2 Richard Wallace Bloss and Mr. R. C. R. Tapper, escaped by parachute.

With reference to the disappearance on August 9 of an aircraft of No. 149 Squadron, the Air Ministry announces with regret that, as extensive searches have failed to find the aircraft and the occupants, it must now be accepted that the following personnel lost their lives on that date: F/O. Thomas Adam Darling, P/O. Frank Edward Board, A/Sgt. Arthur Linkley, A/C.1 Reginald Charles Barr Collins, A/C.1 James William Sadler. F/O. Darling and P/O. Board were the first and second pilots of the aircraft and A/Sgt. Linkley, A/C.1 Collins and A/C.2 Sadler were the other members of the crew.

P/O. Harold Stewart Olding (flying solo) lost his life in an accident which occurred on August 11 at Tatsfield, Surrey, to an aircraft of No. 32 Squadron.

F/O. Arthur Robin Buchanan-Wollaston lost his life in an accident which occurred on August 11 at Tatsfield, Surrey, to an aircraft of No. 32 Squadron.

F/O. William Kinane and Sgt. Peter Aitken Allan lost their lives, and A/C.1 Ivor Roberts was seriously injured as the result of an accident which occurred at Carlton, near Bedford, on August 11, to an aircraft of No. 218 Squadron. F/O. Kinane was the pilot of the aircraft and Sgt. Allan and A/C. Roberts were the other members of the crew.

Royal Air Force Gazette

Air Ministry, August 8

Royal Air Force

General Duties Branch

The following are granted short-service commissions as Acting Pilot Officers on probation for six years on the active list on the dates stated:—

July 22.—M. T. H. Adams, J. F. W. Allen, B. G. Aston, G. A. Atkinson, G. M. Bailey, R. C. W. Barnes, R. P. Baxter, G. H. H. Coates, E. F. V. Copsey, C. S. Courtney-Clarke, W. O. Cramer, D. F. Davies, N. Davson, T. Dawson, S. S. Duff, J. M. Ennis, C. D. Frost, C. W. Handley, J. A. Heath-Brown, A. J. Hereford, L. J. Huggett, D. J. Isted, P. F. Kennard-Davis, I. H. Kingwell, N. L. Letten, P. W. Lovell, R. C. Miller, T. D. Misselbrook, E. S. S. Nash, A. C. O'Hara, V. Parker, E. G. Pett, H. A. R. Prowse, B. Raises, R. E. Ransome, E. B. Rendall, E. S. Roberts, L. D. Ryan, M. A. Sims, B. Smith, D. D. Snooke, A. J. Stevens, A. Takideli, R. P. Wigley-Jones, H. D. Willis, J. Winter, C. R. Young.

July 24.—J. E. Lowe.

July 28.—J. G. K. Long.

The following are granted short-service commissions as Acting Pilot Officers on probation for four years on the active list (July 22):—H. C. M. Bamber, W. G. C. Edmonds, R. A. Greenhill, J. F. Percival, A. F. B. Ramsay, R. R. Sandford.

The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers on the dates stated:—May 13.—M. C. Kinder. June 27.—A. R. T. Barnes, R. F. Helm, R. Lane, P. C. Lindsey, C. W. McNeill, P. H. Preston, M. Radcliffe, T. G. Rhodes, J. C. Smitheram, V. G. D. Spiller.

The following Acting Pilot Officers on probation are graded as Pilot Officers on probation (June 27):—D. O. M. Browne, H. D. Dawlish, F. E. G. Rashleigh, A. J. Smith, R. V. Whitehead, P. V. Lockett.

Flt. Lt. S. G. Birch is promoted to the rank of Squadron Leader (August 1).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—April 14.—F. J. O. Lasbrey. July 13.—F. C. Hopcroft, D.F.C. August 1 (seniority November 1, 1938). —N. M. Bayliss (Acting Flight Lieutenant).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—April 18.—B. Brooke. June 16.—J. B. Garland. June 21.—P. L. Burke, H. M. Selwyn, G. Packe. July 12. —J. H. Williams, A. M. Lvall. July 21.—W. D. Corr, A. R. Holmes, D. D. McPetrie, L. P. Cattell (Acting Flight Lieutenant). A. S. Mirylees, L. R. Cohen.

Air Comdre. A. A. Walser, M.C., D.F.C., is granted the acting rank of Air Vice-Marshal (unpaid) (August 1); Group Capt. K. C. Buss, O.B.E., is granted the acting rank of Air Commodore (unpaid) (August 1).

The following are granted the acting rank of Flight Lieutenant on the dates stated:—

Flying Officers.—January 16.—P. C. Pinkham. March 2.—A. D. Jackson. April 11.—J. H. Wedgwood.

Pilot Officer.—G. W. Slee (March 2).

Service Aviation

The following Flying Officers relinquished the acting rank of Flight Lieutenant on the dates stated:—V. Ray (May 30); W. Townson (July 4); D. H. C. Hull (July 11); J. V. Hoggarth, R. C. Ayling, M. V. Peters-Smith, P. E. G. G. Connolly, W. A. L. Davis (July 23); P/O. A. W. H. Reader relinquishes the acting rank of Flight Lieutenant (July 23).

The following Flying Officers are transferred to the Reserve, Class A (August 6):—P. J. Halford, D. C. Smythe, G. Thomas.

The following relinquish their short-service commissions on transfer to the Royal New Zealand Air Force on the dates stated:—F/O. J. Adams (July 10); P/O. W. H. Coleman (July 7); the notification concerning F/O. L. C. Withall in the *Gazette* of July 4 is cancelled.

Accountant Branch

The following are granted short-service commissions as Acting Pilot Officers on probation (July 29):—T. P. Abbott, W. Buckley, E. R. H. Caven, W. R. Davidson, E. S. Dixon, J. S. Doughty, A. E. Ekins, C. P. Evans, R. B. Evans, J. F. Goldring, H. R. Harman, M. W. Harrison, W. L. Hughes, R. T. Humphreys, H. H. Jackson, C. G. T. Lindsay-White, K. L. Macdonald, W. Mackirdy, T. M. Masters, A. Moorcroft, W. G. Morgan, W. Muckleroy, J. E. Nevitt, G. H. Pears, C. A. Pitt, J. R. Pullan, S. Robinson, W. C. A. Robinson, W. N. Sarginson, C. G. Strachan, F. G. Turner, I. I. Watkins, H. H. Wright, D. R. Yeoman; F/O. (Acting Flt. Lt.) R. F. L. Hart is promoted to the rank of Flight Lieutenant with effect from May 25 and with seniority of April 14.

Medical Branch

A.V-M. Sir Albert Victor John Richardson, K.B.E., C.B., M.B., B.Ch., D.P.H., K.H.S., is promoted to the rank of Air Marshal (August 1); Sqn. Ldr. T. J. X. Canton, M.B., B.Ch., is promoted to the rank of Wing Commander (July 1).

Commissioned Engineer Officer

W/O. G. Baldwin is granted a commission as Flying Officer on probation with effect from July 27 and with seniority of June 12.

Commissioned Signals Officers

The following Warrant Officers are granted commissions as Flying Officers on probation with effect from the dates stated and with seniority of June 12):—E. H. Webb (June 19); G. Dod, G. Costick, H. M. Aspen, C. Herbert, R. S. Neil (July 27); C. E. Spurgeon (July 31).

Commissioned Armament Officer

W/O. G. J. Downs is granted a commission as Flying Officer on probation with effect from July 27 and with seniority of June 19.

Cranwell.—Casement, P. R.; Tomlinson, P. A.; Erskine, B. P.; Gilbert, H. G.; †Cox, M. I.; Watling, W. C. ; Jenkins, H. A.; Dawson, G. N.; Pritchard, P. H. H.; Brown, J. G.; †Maynard, N. M.; Fulford, D.; Parker, R. H. W.; Elkington, J. F. D.; Whatley, W. D.; *Haigh, J. G.; Gilbert, R. M. R.; Garrard, P.; Thomson, C. H.; Watson, A. R.

Honorary King's Cadet who is successful for Cranwell.—Phillips, A. M.

†Nominated for Honorary King's Cadetship. *Admission of this candidate subject to further evidence regarding medical fitness.

"Flight" photograph.

WHAT THE SECOND PILOT SEES from the corner of his eye. A unusual study of the pilot of a "friendly" Wellington, secured at some thousands of feet over the North Sea during the Air Exercise.

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

B. S. Smallman is granted a commission as Flying Officer in Class C with effect from July 25 and with seniority of October 9, 1938; Capt. A. D. Wilson (I.A. Ret.) is granted a commission in Class CC as Flight Lieutenant (Honorary Squadron Leader) (July 3).

The following are granted commissions in Class CC in the ranks and on the dates stated:—

Flight Lieutenants (April 11).—F/O. J. F. V. Sugars (R.A.F. Ret.). May 9.—Lt. E. T. H. Hill. May 15.—Engr. Cdr. H. T. Evans (R.N. Ret.). May 19.—Commissioned Telegraphist E. Grave (R.N. Ret.). June 12.—Capt. E. K. Cormudy (R.A.R.O.). June 14.—Lt. G. Austin. June 26.—M. K. McGregor. June 29.—Capt. J. W. Fraser (R.A.R.O.).

Flying Officers.—April 28.—Lt. N. Couve. May 1.—Sec. Lt. E. Turnbull. May 31.—C. A. Moore. May 25.—R. C. Egerton-Green. March 13.—G. B. Savi.

F/O. L. A. Jessop, D.F.C., is granted the rank of Flight Lieutenant (Hon. Squadron Leader) (April 1).

The following Flying Officers are granted the acting rank of Flight Lieutenant in Class CC on the dates stated:—May 22.—J. E. Beynon (R.A.F.O.). May 31.—R. K. Coupland (R.A.F.O.).

Flt. Lt. L. V. Bennett, M.C., relinquishes his commission in Class CC on completion of service (July 6); F/O. G. J. S. Chatterton relinquishes his commission on completion of service (June 27).

Equipment Branch

Lt.-Cdr. J. W. F. Milner-Gibson (R.N. Ret.) is granted a commission in Class CC as Flight Lieutenant (May 4).

Dental Branch

Flt. Lt. J. M. Jamie, L.D.S., relinquishes his commission on completion of service and is permitted to retain his rank (July 1).

Miscellaneous

Flt. Lt. N. H. Dimmock, A.F.C., is transferred from the General Duties Branch on appointment as Assistant Provost-Marshal (May 30).

Royal Air Force Volunteer Reserve

General Duties Branch

Flt. Lt. J. H. M. Smith (Res. of Off., R.N.Z.A.F.) is granted a commission as Flight Lieutenant (August 1).

The following are appointed Hon. Flight Lieutenants on the dates stated:—May 23.—Capt. G. O. Hewett, D.S.O. (R.N. Ret.); June 1—Lt.-Col. J. M. G. Taylor. June 26.—Lt.-Col. H. A. Thewles, D.S.O.; Lt.-Col. S. P. Williams, C.I.E. (I.A. Ret.). July 3.—Col. R. B. Cousens, D.S.O. (R.A.R.O.).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—May 11.—P. Dunphy. May 24.—L. A. Simpson.

Administrative and Special Duties Branch

The following are granted commissions as Pilot Officers on probation (August 1):—C. Blake-Smith, R. A. Dimsdale, H. R. Gardner, S. A. Hamilton-Bowyer, L. F. Heald, J. D. V. Holmes, J. C. Lawrence, H. L. Madge, R. H. S. Mealing, C. B. Millett, B. Robinson, R. Brudenell-Bruce Sievier, T. G. Simpson.

Pilot Officer on probation T. E. Pennington is granted the acting rank of Squadron Leader (August 3).

Equipment Branch

The following Acting Pilot Officers on probation are confirmed in their appointments on the dates stated:—July 10.—L. H. Wesson. July 17.—H. E. Lewis, A. W. Low.

Medical Branch

J. MacKellar, B.Ch., M.R.C.S., L.R.C.P., is granted a commission as Flying Officer (August 8); Flt. Lt. G. G. Stewart, M.R.C.S., M.R.C.P., D.P.H., resigns his commission (April 20).

Meteorological Branch

The following are granted commissions as Pilot Officers on probation (August 1):—P. D. Bailey, R. B. Barnes, J. Bell, L. S. Bill, J. E. Blamey, M. W. Brown, L. W. Carroll, J. A. Chaldecott, A. E. Chapman, L. J. M. Coleby, A. J. Compton, C. Crichton-Miller, C. R. Crinson, G. A. Darlow, T. F. Davies, B. F. Drew, W. J. Elliott, G. J. Evans, J. Field, R. A. Fleming, D. H. Follett, F. R. Ford, J. L. Fowke, G. E. G. Gibson, L. G. Hall, S. F. Hann, A. V. Hardy, J. J. Higgins, R. C. Hocking, R. C. Honeybone, H. F. T. Jarvis, G. H. Jones, J. R. Jenkins, V. P. Kelly, H. H. J. Leigh-Clare, J. B. Leno, F. C. L. Littlejohns, D. C. Lloyd, E. A. Lunson, L. Marchant, N. B. Marshall, G. R. Mason, H. A. Matthews, J. E. E. McLaren, J. V. Meyer, M. K. Miles, R. J. Murgatroyd, W. P. Osmond, R. E. Overbury, V. Packer, W. A. Perkins, F. J. Phillips, H. G. Robinson, L. H. Shave, P. T. Silley, S. W. Slaughter, W. F. Spinks, J. Stephenson, J. E. Thomas, W. E. Tomkin, T. H. Tyler, E. H. Varley, F. A. Walch, H. L. Walker, J. E. Walsh, W. H. Weaver, E. J. Wenham.

ITALY'S "BLENHEIMS"; Breda 88 multi-purpose monoplanes (two 1,000 h.p. Piaggios) now coming into service with the *Regia Aeronautica*.

Auxiliary Air Force

General Duties Branch

No. 500 (COUNTY OF KENT) SQUADRON.—The following are granted commissions as Acting Pilot Officers (July 24):—B. M. Denny, I. S. Wheelwright.

No. 501 (COUNTY OF GLOUCESTER) SQUADRON.—C. D. Griffiths is granted a commission as Flying Officer (May 19).

No. 600 (CITY OF LONDON) SQUADRON.—S. F. F. Johnson is granted a commission as Acting Pilot Officer (July 13).

No. 601 (COUNTY OF LONDON) SQUADRON.—J. K. U. B. McGrath is granted a commission as Acting Pilot Officer (July 6).

No. 602 (CITY OF GLASGOW) SQUADRON.—The following Flying Officers are promoted to the rank of Flight Lieutenant (April 30):—J. D. Urie, A. V. R. Johnstone.

No. 604 (COUNTY OF MIDDLESEX) SQUADRON.—F/O. J. W. Charters relinquishes his commission on account of medical unfitness (May 8).

No. 608 (NORTH RIDING) SQUADRON.—The Hon. P. I. Cunliffe-Lister is granted a commission as Acting Pilot Officer (July 18).

No. 614 (COUNTY OF GLAMORGAN) SQUADRON.—W. J. G. Morgan is granted a commission as Acting Pilot Officer (June 3).

No. 616 (SOUTH YORKSHIRE) SQUADRON.—The Most Hon. the Marquess of Titchfield, M.P., is appointed Honorary Air Commodore (August 8).

The following are granted commissions as Acting Pilot Officer on the dates stated:—*Acting Pilot Officers.*—T. B. Murray (July 19); J. Brewster, L. H. Casson, H. S. L. Dundas, J. B. Hatchwell (July 23).

No. 902 (COUNTY OF LONDON) SQUADRON.—F/O. T. R. Bird is promoted to the rank of Flight Lieutenant (July 6); Acting P/O. H. Mills is promoted to the rank of Flying Officer (July 14).

No. 903 (COUNTY OF LONDON) SQUADRON.—L. T. Rye is granted a commission as Acting Pilot Officer (July 5).

No. 908 (COUNTY OF ESSEX) SQUADRON.—R. V. Saltmarsh is granted a commission as Pilot Officer (July 27).

No. 924 (EAST LANCASHIRE) SQUADRON.—The following Acting Pilot Officers are promoted to the rank of Flight Lieutenant on the dates stated:—May 15.—S. J. Palmer. May 16.—H. G. Dehn. May 19.—W. Gresty, M.C.

Acting P/O. F. B. Holt is transferred to No. 926 (East Lancashire) Squadron (May 15).

No. 925 (EAST LANCASHIRE) SQUADRON.—C. U. Lloyd is granted a commission as Flying Officer (May 18); Acting P/O. F. W. Shea, M.C., is promoted to the rank of Flying Officer (May 17).

No. 926 (EAST LANCASHIRE) SQUADRON.—Acting P/O. F. B. Holt is promoted to the rank of Flying Officer (May 15).

Accountant Branch

No. 613 (CITY OF MANCHESTER) SQUADRON.—J. M. Horsley is granted a commission as Flying Officer (June 28).

General List

Sqn. Ldr. the Hon. W. L. Runciman, A.F.C., is promoted to the rank of Wing Commander (June 21).

A NEW GERMAN BOMBER: A revised version of the Heinkel He. 111 bomber is in service with the *Luftwaffe* as shown in these views secured during the recent German exercises. It has a shorter, roomier nose and an external lower gun position or observation post. The engines can be Daimler Benz D.B.601s or Junkers Ju.211s.

EASTBOURNE'S AFTERNOON

An International Atmosphere at the Eastbourne Club's Garden Party: Interesting Demonstrations at Display

ALTHOUGH the Eastbourne Club's Garden Party at Wilmington aerodrome last Saturday was not graced this year by those high officials in aviation circles who add tone to such meetings with their speeches, there is no doubt that it was one of the most enjoyable functions of its kind. What is more, it took on quite an international flavour, for of the many visiting aircraft several had come from Germany, France, Belgium, and even as far away as Poland.

Throughout the sunny afternoon a somewhat massive but excellently supported programme was attacked and frequently departed from in a delightful impromptu manner. But as was the case last year, the only criticism that could be offered was on the score of its length. At the same time, it should be stressed that the Club had seen fit to introduce one or two instructive items not strictly connected with flying, but which did provide a refreshing break to those who had seen one or more demonstrations beforehand.

Between mid-day and 2.15 p.m. aircraft began to arrive, for within this period an arrival competition was being held. Visiting pilots were directed where to park their machines by the ever-handy A.A. scouts, and then greeted by officials who drove them to the clubhouse, where they were welcomed by the Eastbourne Club's chairman, Mr. C. A. Wilson.

By this time the enclosure in front of the clubhouse had begun to fill, while spectators from Eastbourne and the surrounding districts arrived by the hundred.

The first part of the programme was devoted to demonstrations headed by a Tipsy piloted by Mr. A. Munro in the place of Sqn. Ldr. E. Mole, who is still unfortunately *hors de combat* after his accident in the Folkestone Trophy Race the previous week-end. Munro showed how the Tipsy could climb. In fact, one could be pardoned for suggesting that it climbed almost too well, for although the Tipsy was made to loop and spin with ease, it required good eyesight to see these manœuvres from ground level.

A rather more dashing show was put across by F/O. Pickard in the low-wing BiBi-Be 550. After a series of smoothly executed steep turns and dives the BiBi was brought in rather too low over the aerodrome boundary hedge for the mental comfort of the onlookers. Even so, F/O. Pickard was able to pull off a very neat three-pointer at the critical moment. Almost before he had landed Mr. Hollis Williams was off in the General Aircraft Cygnet, which incidentally was the first production model of its type. After last Saturday there can be no doubt that Mr. Williams has got this tricycle business thoroughly weighed up. His high-speed approaches were enough to make any sensitive pilot groan in anguish as the Cygnet merrily romped into the ground at a steady 75 m.p.h., but seemingly miraculously was able to pull up within 70 or so yards without any difficulty. At other times he showed how easy this machine would be to put down in a small field. Gaining a little altitude the Cygnet was made to loop and half roll out of the top and even to dive on its back just to show that a machine which is easy to fly can also be aerobatically minded.

Next came Mr. George Miles, F. G.'s brother, who proceeded to put the latest Miles Monarch through its paces with a series of perfectly judged turns and loops, finishing up with an almost lift-like approach after the best (Going down, Madam) Miles traditions.

By this time one demonstration was beginning to get rather like any of its predecessors. However, Mr. G. N. Wickner took up one of the new Wickos and showed, at a somewhat nerve-shattering low altitude, what a handy aerobatic machine a two-seater cabin aircraft can be.

As soon as the Wicko landed the Hon. A. W. H. Dalrymple arrived in the little Train-engined Chilton. Almost immediately he took off again to put up an excellent show in this comparatively speedy aircraft. In fact, after last Saturday anyone could be pardoned if they left Wilmington convinced that there was nothing in the way of flying which the Chilton could not do.

The demonstrations proper were brought to a close with a neat performance by Mr. B. T. Hardy in a Taylorcraft. Approaching parallel to and quite near the lines of spectators, he proceeded to clear the boundary by a matter of inches, and landed—he almost dropped it—with so little forward speed that the machine pulled up within less than a dozen yards.

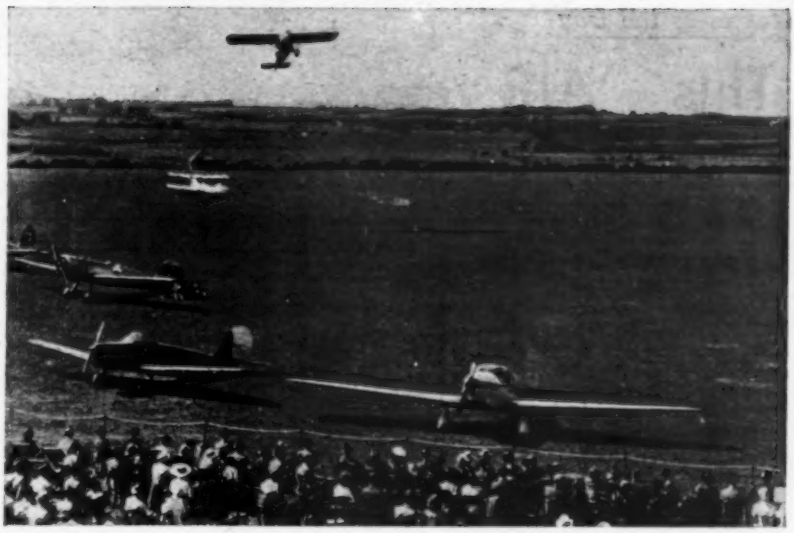
Under the intriguing heading of "Back your fancy," the next part of the programme proved to be a handicap race between a Gipsy I Moth flown by F/O. O. T. Hazel, a Whitney Straight piloted by Mr. L. Bellairs, and a Messerschmitt Taifun piloted by Herr E. A. Scheidt. Unfortunately the handicapping went a trifle astray, for the Taifun overhauled the little Gipsy, as if the latter was part of the balloon barrage, when it still had another lap to go. The Whitney Straight apparently went astray, for it disappeared behind some hills for quite a considerable time. While the race was on George Solak was cruising around in his Polish R.W.13 on his return from Shoreham, where he had been sent to clear Customs.

After a somewhat humorous interlude in which two Gipsy Moths were used to bomb a car driven up and down the aerodrome, Fräulein Vera von Bissing took off in her B.F.W. M35 to give one of those highly polished and perfectly executed aerobatic exhibitions that have made her name famous throughout Europe. Her programme ranged from simple loops to half bunts in both upward and downward directions. Her slow rolls were gems of precision, while the old Siemens-engined M.35 seemed to be just as at home doing steep turns on its back as when flying in a more orthodox attitude.

After this exhilarating performance a platoon of the Middlesex regiment gave a demonstration of how the Bren gun is used on aircraft daring to come within their range—for this purpose two Moths snooped around the countryside, making, at intervals, dashes across the field of fire.

While the various sections were deployed across the aerodrome an innocent Hornet arrived, to the horror of all concerned and Rex Stocken in particular—the latter was nobly doing the running commentary and his comments *sotto voce*

A view from the control tower of a small section of the large crowd at Wilmington last Saturday. In the background can be seen a B.F.W. M-35, Tipsy, Wicko and the new Parnall Trainer.



Mr. G. N. Wickner, in his Wicko, zooms up over some of the visiting aircraft, during the course of a demonstration flight.

were heard very clearly over the loud-speakers. They were at least explicit.

Next came two brief demonstrations, one by Crossley Warren in the new Parnall Trainer and the other by George Solak in the R.W.D.-13. The former's show was very polished and included a series of power dives into the centre of the aerodrome from behind the spectators—very frightening. The latter, however, wisely contented himself with a few genteel fly-pasts, afterwards most politely doffing his hat to the applauding crowd.

Before the grand parade of all the visiting aircraft, which brought the afternoon programme to a close, Miss Ray Clark jumped from a Moth flying at 2,000ft. Her parachute opened immediately and she landed with perfect accuracy in the middle of the aerodrome. Unfortunately she lost her grip of the shroud lines and was unable to spill the air, with the result that both she and a near-by official were dragged some distance in the fresh breeze before help arrived. In a few seconds the canopy was got under control and stowed into a waiting car.

The prize-winners for the arrival, distance and concours d'elegance were then announced. George Solak had flown that day from Lwow in Poland in his R.W.D.-13, and so he rather naturally went home with the prize for having come the greatest distance. R. P. Mason won the award for the open class in the concours d'elegance with his Moth Minor, while Herr E. Gerbrecht won the closed class with his superbly finished Arado 79—a roomy two-seater side-by-side low-wing monoplane with an inwardly retractable undercarriage. Herr Gerbrecht also won the arrival competition by a short head from F/O. Pickard in the BiBi-Be 550. Mr. Anson, of Hull, won the distance competition for English competitors.

Eastbourne's Garden Party in theory ended with the presentation of awards by His Worship the Mayor of Eastbourne, but in actual fact it continued well on into the evening with the erection of a searchlight by a detachment of the Queen's Royal Regiment. Additional high-spots were a firework display and a realistic bombing raid in which the searchlight boys got busy and all the A.R.P. Volunteers from the surrounding districts co-operated. Altogether a very convincing show.

Fräulein Vera von Bissing makes her point (or appears to do so) when chatting with two German companions in the shade of her B.F.W. M-35.

TWO MORE BOOKS

Another Book for the Beginner

"The C.A.G. Book," by Malcolm Logan; 3s. 6d., Ivor Nicholson and Watson, Ltd., 7, Paternoster Row, London, E.C.4.

WITH the enormous number of prospective "A" licensees and the relatively small number of "B" licence aspirants, it is, one supposes, inevitable that there should be at least half a dozen books dealing with the initial principles and none covering the "B" licence syllabus. *The C.A.G. Book* is quite a good one and fairly complete in the general flying instruction, the elements of pilotage, the description of "A" licence requirements, and the résumé of the essential air traffic rules, but there is nothing particularly new about it except the chapter dealing with the history of the Civil Air Guard and the constitution of this organisation. Why is it, incidentally, that no aviation writer appears to have discovered that flaps are now part of the normal equipment of the majority of training aeroplanes?

The section devoted to elementary navigation is concise, with clear and somewhat original diagrams. In addition, the essential right-of-way rules are explained with coloured diagrams which are accompanied by a series showing the various ground panels used at aerodromes.

There are so many books covering much the same ground that it is impossible for the writers concerned to handle their subjects without signs of plagiarism. There are several passages in Mr. Logan's book, particularly in the section dealing with flying instruction, which have a certain, if inevitably familiar ring. However, the accuracy of the practical advice should be guaranteed by the fact that Mr. G. Errington, the chief test pilot at Airspeeds, has assisted in its production.

Professional Advice

"Instrument and Radio Flying," by Karl S. Day; Distributed By Air Associates Inc., Roosevelt Field, Garden City, New York.

FOR any professional pilot who wishes to obtain really accurate and up-to-date information about American radio and instrument flying methods, Major Day's book can be recommended. He is—or was at the time he wrote the book—instrument flying instructor and assistant flight superintendent at American Airlines, and his book, while covering instrument, radio-range and approach-flying according to airline procedure in the United States, also describes, from the pilot's point of view, some of the very latest items of equipment. The approach and beacon-flying diagrams are excellently clear.

Although probably fifty per cent. of this book is likely to be of very little direct use to British or European pilots, the balance should be valuable, and the whole of it is nothing if not educative. The chapters dealing with the characteristics of what the Americans call radio ranges, and the methods of flying on them, are outside the European sphere, though we may yet find a use for such items of equipment.

Among the newer instruments described from the pilot's viewpoint are the Sperry gyro-magnetic compass (which combines the advantages, as its name implies, of the directional gyro and the compass) and the Stark airport orientator. Apparently the difficulty with the gyro-compass is that non-magnetic races must be used, and these are not yet, consequently, of absolute reliability. Other comparatively new developments are the Metcalfe three-point landing system and the Sperry Flightray. These, with the Sperry and Stark instruments, have already been described in *Flight*.

Topics of the Day

This "AIR AGE"

"Indicator" Insists that it has Come, and Asks—What is Being Done About It?

FOR years people have talked about the coming "air age" and of the day when the man in the street (whoever he may be) will be able to use some kind of flying machine (yet to be invented) for travelling from here to there. The other day, in a blinding flash of the obvious, it occurred to me that the private aeroplane had arrived, that the "age" had arrived, and what was all the talk about??

"Flight" photograph.

PRIVATE FLYING, *CIRCA* 1910: There may or may not be lessons for present-day light aeroplane designers in this special Bleriot built for M. Deutsch de la Meurthe with the enclosed cabin, the open-air, brougham-esque position of the driver (his column can just be seen) and the forward elevator. It did actually fly, air resistance notwithstanding, on a very doubtful 100 h.p.

Naturally there will be improvements, year by year, and new ideas in the way of flap design, wing sections, and what are carelessly known as giroplanes may eventually make flying safer, more comfortable and more useful. But for the moment we have something, and it only requires real energy and financial optimism for flying, both private and public, to be ten times as popular as it is at present. Nobody will deny that the automobile has "arrived," but it still contrives to kill quite a large number of people every year.

Over here there has not been any very big attempt to mass-produce light aeroplanes, but there are plenty of types from which to choose, and in America design has very largely settled down into certain grooves. Light aeroplanes there can be bought more or less off the shelf, and these machines provide a fairly good performance at comparatively low initial and later costs, with a standard of comfort which can still be improved, but which is at least almost equal to that offered in the ordinary light car.

With the Civil Air Guard scheme under way, there should be two or three thousand partly trained pilots in the air by the summer of 1941, and at least a fair proportion of these will not only want to do more flying, but will have the money (either individually or in syndicates) to buy aeroplanes which are useful as well as cheap. Now, it seems to me, is the time to prepare for what will probably be quite a useful market. This market can only be filled by machines costing not more than £500, carrying two people, and cruising, at low running costs, at not less than 90 or 100 m.p.h. The successful types must have a good take-off and a good climb, be reasonably viceless, and offer a good all-round view for both occupants.

Active Discouragement

As I have said before in these columns, nobody is going to risk buying aeroplanes which may or may not be in existence six months hence. Half-hearted attempts at production are not likely to be any good. Those who believe that a future market is there must decide once and for all what they think is wanted and stick to it. It is no use at all to fuss around with a lot of different hand-made prototypes, each laid out on entirely different lines, and then make a decision about one month before you expect to start selling the machines. At least a year is required for development work, and during that year the chosen type must obtain a good name for itself either by direct demonstration or by steady encouragement among club members and club instructors.

Of course, the fact is that we have never in this country had any organisation or body ready to make any real attempt to push private flying. One supposes that the Royal Aero Club might have been doing something about it during the last twenty years, but the majority of the more powerful members of that organisation rarely, if ever, fly, and are certainly not much interested in encouraging anybody else to fly. Admittedly, they try to encourage existing private owners to go to various flying parties and events both here and abroad—but the encouragement is not very strong, and the ordinary aircraft owner certainly does not expect to find many kindred spirits in the club premises.

Just recently the American Civil Aeronautics Authority has been working very hard to increase the amount of private flying done in the U.S., and has been formulating basic requirements for really safe and sensible light aeroplanes. The Authority's latest scheme is to help the sale and use of seaplanes by the selection of base sites and the making of cost-price floating pontoons at these sites. Already more than two hundred sites have been selected and quite a few pontoons have been built.

The American Market

Not that I am suggesting that the seaplane idea stands a very good chance in this country—I am merely trying to show what *can* be done by a vigorous and enthusiastic organisation. In due course the Air Registration Board may play an important part in private flying development, but at the moment this Board is much too busy on the normal routine C. of A. work which it has taken over.

Recently, as a matter of interest, I counted the number of genuine private aeroplane types now being produced in America. It seems that these types can fairly be divided into three categories. The first is the easy-to-fly lightweight; the second is what I call the intermediate type, with rather more power and more robust characteristics, but still capable of being flown by ordinarily competent amateurs; and, thirdly, there is the super aeroplane which really ought only to be flown from fair-sized airports by either very skilled amateurs or professional pilots. In addition, there is a new class of medium-sized aeroplane with tricycle undercarriage, patent flap devices and other aids to stall-proof flying. One or two of these have still to be produced in quantity, and it is of interest to note that there are only two private aeroplanes at present available in America with three-wheeled undercarriages.

The greatest number of current types are in what I have called the intermediate class—including such machines as the Stinson Reliant and the Fairchild 24. There are just a dozen here. Next comes the lightweight, or near lightweight group with nine different types—three of which are being sold in very considerable numbers. So far as I can make out there are only four of the super private aeroplanes, though this figure does not, of course, include

transport or semi-transport machines which may be used for private travelling by very rich owners.

There has been something like a Wall Street slump over unconventional safety-first types, but it is reasonable to suppose that the one or two which are still in existence will eventually go into production. The queer things which were made a year or two ago, more or less to the order of the old Bureau of Air Commerce, arrived a little before their time, but the lessons learned in their construction and test flying should be extremely useful. By 1941 the owner should surely be ready for tricycle—or, as I prefer to call them, level-landing undercarriages—two-control arrangements and interconnected air-brake flap devices. But at the moment the conventional machine, typified by the 50 or 60 h.p. lightweight and the 200 or 300 h.p. four-seater, has reached a very fair state of air safety. Pilots do not always like strange machines and are liable to be a little superior if the aeroplane which they are expected to buy requires too little skill in its operation. Until everybody is trying to get into the air the average amateur pilot will continue to be a person who prefers a little (but not too much) of the spice of difficulty and danger. INDICATOR.

Wasted Courage

UNLESS they have been picked up by a ship without wireless, it can only be supposed that the two American pilots, Alex Loeb and Richard Decker, have joined the many who have been lost in strange Atlantic attempts. They took off from St. Peter's, Nova Scotia, on Friday morning with an old Ryan monoplane carrying 180-odd gallons of fuel—42 of them in separate tins, which were to be used to replenish the cabin tank. The whole supply could only have lasted for 23 hours' flying. They expected to reach Eire in 20 hours' flying.

Triple Goal Flying

WITH unusually favourable conditions three sailplane pilots left Huish, near Marlborough, in the early afternoon of August 7 with the avowed intention of flying to Dunstable. All reached this destination. The pilots were Messrs. D. G. Hiscox (Kirby Gull), R. P. Cooper (Rhonbussard), and C. Nicholson (Rhonsperber). All three sailplanes were winch-launched at Huish.

Elmira Again

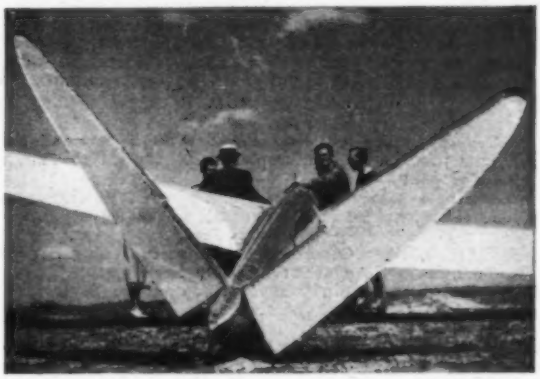
AT the recent International Soaring Contest, held as usual at Elmira, New York, Lt. R. Stanley broke the American altitude record with a climb to 17,264ft. He also made quite a few long-distance flights, including one from Elmira to the World's Fair—a distance of 200 miles. He was flying a somewhat unusual all-metal sailplane which has no rudder in the ordinary sense. The two sides of the tailplane are cocked up at an angle of about 45 deg. and the elevators are differentially controlled to act both as elevators and rudders. He was unfortunate enough to shed an entire wing during the Contests—the tenth of the series—but with the new tail the rest of the *Nomad* sank slowly and was not badly damaged.

The Contests were actually won by Mr. Chet Decker, who piled up 3,020 points. Lt. Stanley was second.

Among the visitors at the meeting was Herr Wolf Hirth, the well-known German pilot, designer, and pioneer of motorless flight, and he gave a display of "silent aerobatics" in one of his American-owned sailplanes.

Actually some forty machines entered the contest. Most of them were of American design, but a fair number of German sailplanes, including the Rhonsperber and the Minimoa, were represented. Incidentally, the Americans tend to go in for all-metal construction even in their sailplanes. Apart from Lt. Stanley's original machine, which is of stressed-skin construction, the Schweitzer two-seater is also an all-metal type.

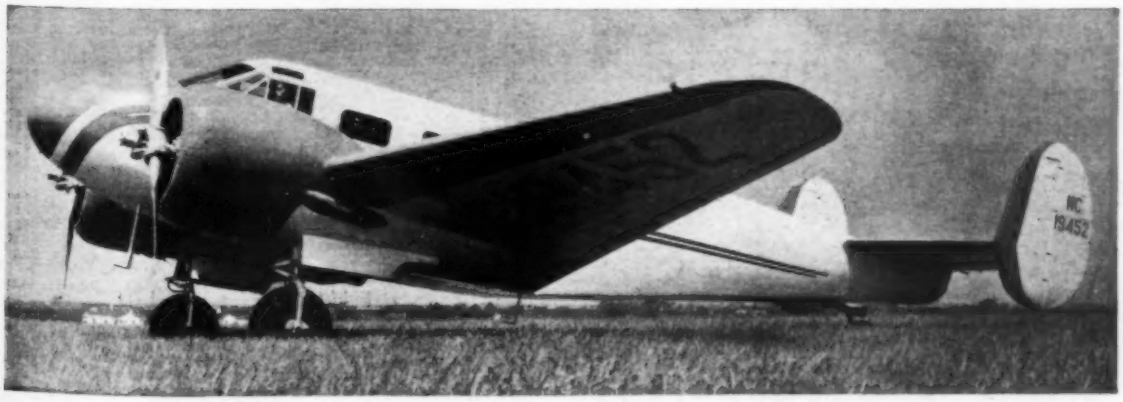
The American soaring headquarters on Harris Hill, Elmira, are very complete indeed. In addition to the hangar and demonstration buildings, the visitors and sailplane pilots have a swimming pool and comfortable living accommodation. The administration building has full radio and meteorological facilities. The U.S. Government has financially aided the Soaring Society of America with the Elmira project.



ORIGINAL EMPENNAGE: The tail of Lt. Stanley's sailplane Nomad, which broke the American altitude record (and a wing) at the recent Elmira meet. The movable surfaces act, through a differential mechanism, both as elevators and rudders.

Another Record

DURING the five days of the Bank Holiday week-end, Western Airways carried 4,872 passengers. This figure is almost double that for the five days at Whitsun, which was itself probably a world's traffic record for any airline. The majority of the passengers, of course, flew on the Weston-Cardiff route, on which there are now fifty-eight services a day.



THE LATEST BEECH: Various changes are noticeable in the new 18S Beechcraft which has 450 h.p. Wasp Junior engines and constant-speed airscrews. The design of the tail has been modified to provide an even better single-engined performance as far as piloting is concerned, but the most interesting feature of the Wasp Junior-engined Beech is the design of the engine cowlings with a smooth contour which not only reduces resistance, but also gives an even flow over the upper surface of the wing. No air is discharged above, the cooling being regulated by means of flaps on the lower half of the cowling.

THE ROYAL AERO CLUB

News and Official Notices for the Week Ended August 12

THE Royal Aero Club has been notified of the following performances which have been submitted to the Fédération Aéronautique Internationale for recognition as World or International Class Records.

The figures are provisional and subject to verification.

WORLD RECORD.

Distance in a closed circuit (Italy): A. Tondi, R. Dagasso and F. Vignoli, in S82PDI Italo, 3 Alfa Romeo 128RC21 each of 860 h.p., July 30-August 1: 12,935.770 km. (8,037.97 miles).

INTERNATIONAL CLASS RECORDS.

Class C. (Landplanes).

Distance in a closed circuit (Italy): A. Tondi, R. Dagasso and F. Vignoli, in S82PDI Italo, 3 Alfa Romeo 128RC21 each of 860 h.p., July 30-Aug. 1: 12,935.770 km. (8,037.97 miles).

Speed over 10,000 km. (Italy): A. Tondi, R. Dagasso and F. Vignoli, in S82PDI Italo, 3 Alfa Romeo 128RC21 each of 860 h.p., July 30-August 1: 236.979 km./hr. (147.24 m.p.h.).

RECORDS WITH PAY LOAD.

2,000 kg. pay load.

Speed over 2,000 km. (Germany): Ernst Seibert and Kurt Heintz in Ju.88 on Dessau-Zugspitze base. July 31: 501 km./hr. (311.31 m.p.h.).

Speed over 5,000 km. (U.S.A.): Major C. V. Haynes, in Boeing XB15, August 4: 299.320 km./hr. (185.79 m.p.h.).

5,000 kg. pay load.

Height (U.S.A.): Captain C. S. Irvine in Boeing B17A at Daytona, Ohio, on August 1: 10,186 metres (33,418ft.).

Speed over 1,000 km. (U.S.A.): Captain C. S. Irvine in Boeing B17A at Daytona, Ohio, on August 1: 415.711 km./hr. (258.31 m.p.h.).

Greatest pay load to 2,000 metres ceiling (U.S.A.): Major Caleb Haynes, in Boeing B15 ("Flying Fortress") at Daytona, Ohio, on July 31: 14,150 kg. (31,195 lb.).

LIGHT AEROPLANES, CLASSED ACCORDING TO CYLINDER CAPACITY.

1st Category (6.5-9 litres).

Height (U.S.S.R.): Borodine, on July 2: 8,760 metres (28,741 ft.).

Height (Germany): Ilig, in BF108, on July 11: 9,125 metres (29,938 ft.).

3rd Category (2-4 litres).

Height (Germany): Platz, in Gotha Go.150S, on July 7: 8,048 metres (26,405 ft.).

4th Category (2-litre maximum).

Distance in a straight line (Germany): Heinz Gabler, in 3M Erla 5D, from Friedrichshafen (Germany) to Vaennaes (Sweden): 1,800 km. (1,118.5 miles).

CLASS C-3 (AMPHIBIANS).

Speed over 1,000 km. (U.S.A.): Captain Sloan in Grumman A09, on July 31: 299 km./hr. (185.79 m.p.h.).

CLASS D (GLIDERS).

1st Category (Single-seaters).

Distance in a straight line (U.S.S.R.): Woman pilot Klepikova in Rotfront 7, on July 6: 750 km. (466 miles).

Distance, returning to point of departure (U.S.S.R.): Kimelman in Rotfront 7, on July 23: 300 km. (186.4 miles).

Goal flights (U.S.S.R.): (1) Satzov, in Rotfront 7, Moscow-Tambov, on June 30: 410 km. (254.8 miles); (2) Satzov, in Rotfront 7, on July 31: 600 km. (372.8 miles).

2nd Category (Multi-seaters).

Distance, returning to point of departure (U.S.S.R.): Kartachev, passenger Chechoulkine, in Stakhanovetz, on July 23: 300 km. (186 4 miles).

FEMININE RECORDS.

Class D (Gliders).

1st Category (Single-seaters).

Distance in a straight line (U.S.S.R.): Klepikova, in Rotfront 7, on July 6: 750 km. (466 miles).

Goal flight (U.S.S.R.): Zelenkova, in Rotfront 7, Moscow-Riazan, on July 6: 195 km. (121.8 miles).

Height (U.S.S.R.): Zelenkova, in Rotfront 7, on July 10: 2,080 metres (6,824ft.).

2nd Category (Multi-seaters).

Distance in a straight line (U.S.S.R.): Velikosseltzeva, passenger Gorokova, in Stakhanovetz, on July 23: 200 km. (124.27 miles).

Goal flight (U.S.S.R.): Velikosseltzeva and passenger Zaviolova in Stakhanovetz, on July 31: 223 km. (138.5 miles).

Height (U.S.S.R.): Velikosseltzova and passenger Vazhalova, in Stakhanovetz, on July 10: 1,600 metres (5,249ft.).

CAPITAL-TO-CAPITAL RECORD.

2nd Category (Pilot and passengers).

Los Angeles-New York (U.S.A.): Major Stanley Ulmstead, in Boeing B17B. Time, 9h. 14m. 30s.: 423.214 km./hr. (262.84 m.p.h.).

Aviators' Certificates

No.	Name	Club or School	Date
19,364	George Stuart Murdoch	Blackpool and Fylde Ae. C.	1.8.39
19,365	David Harold Heald	Blackpool and Fylde Ae. C.	1.8.39
19,366	Arthur Thomas Thomson ...	Blackpool and Fylde Ae. C.	1.8.39
19,367	William Francis Garthwaite ...	Cinque Ports Flying Club	2.8.39
19,368	Donald Sydney George Smith ...	Southend Flying Club ...	2.8.39
19,369	Eric Goss	London Aeroplane Club...	2.8.39
19,370	George Clayton-Greene	Plymouth and Dist. Ae. C.	2.8.39
19,371	John Frederick Harkness ...	Doncaster Aero Club ...	2.8.39
19,372	Joan Stella Gaston	Luton Flying Club ...	2.8.39
19,373	Helen Mary Richardson	Luton Flying Club ...	2.8.39
19,374	James Charles Lawson	Luton Flying Club ...	2.8.39
19,375	Trevor Dudley Cole	Witney and Oxford Ae. C.	2.8.39
19,376	Louis Marcel Andre Green ...	Civil Service Flying Assoc.	2.8.39
19,377	Edward Wells	Ipswich Aero Club ...	2.8.39
19,378	Alexander Paton	Scottish Flying Club ...	3.8.39
19,379	James Beattie Anderson	Scottish Flying Club ...	3.8.39
19,380	Edward Vincent Stevens ...	Isle of Wight Flying Club	3.8.39
19,381	Joseph Edmund Gardner	Liverpool and Dist. Ae. C.	3.8.39
19,382	William Adam Brown	Edinburgh Flying Club ...	3.8.39
19,383	William Walter Briscoe	Malling Aero Club ...	3.8.39
19,384	John Valentine Olivant	Cotswold Aero Club ...	3.8.39
19,385	Laurence Grimes Bedford ...	London Aeroplane Club...	3.8.39
19,386	Lionel Samuel Levitt	Liverpool and Dist. Ae. C.	3.8.39
19,387	William James Curtis	Peterborough Flying Club	4.8.39
19,388	Harry Vincent Edred Marshall ...	Plymouth and Dist. Ae. C.	4.8.39
19,389	William Alfred Sharland	Wiltshire Flying Club ...	4.8.39
19,390	Kenneth Granville Percy Kimber	Wiltshire Flying Club ...	4.8.39
19,391	Cyril Cohen	Herts and Essex Aero Club	4.8.39
19,392	Horace William Brooks	Herts and Essex Aero Club	4.8.39
19,393	Bernard Gerald Murphy	Herts and Essex Aero Club	4.8.39
19,394	Frederick Thomas Cushing ...	Norfolk and Norwich Ae.C.	4.8.39
19,395	Peter Henry Mayne	London Air Park F.C. ...	4.8.39
19,396	Edmund Blackburn	London Air Park F.C. ...	4.8.39
19,397	Kenneth Herbert Ritchie ...	Malling Aero Club ...	4.8.39
19,398	Arthur Augood	Norfolk and Norwich Ae.C.	4.8.39
19,399	Jack Jubb	Portsmouth Aero Club ...	8.8.39
19,400	Trevor Gray	No. 17 E. and R. F.T.S.	8.8.39
19,401	Hugh Carlyon Foster Barham ...	Worcestershire Flying Club	8.8.39
19,402	Geoffrey Walter Garside Tew ...	Cotswold Aero Club ...	8.8.39
19,403	Peter Harold Dimmock	Redhill Flying Club ...	8.8.39
19,404	Harry Alfred Ernest Winfield ...	Witney and Oxford Ae. C.	8.8.39
19,405	Kenyon Oswald Burt	Airwork Flying Club ...	8.8.39
19,406	Owen James Geach Stevens ...	Airwork Flying Club ...	8.8.39
19,407	Geoffrey Huson Stephenson ...	Airwork Flying Club ...	8.8.39
19,408	Denis George Bach	Midland Aero Club ...	8.8.39
19,409	John Patrick Flood	Midland Aero Club ...	8.8.39
19,410	John Gordon Barnett	Midland Aero Club ...	8.8.39
19,411	George Reginald Morton Cooper...	Sheffield Aero Club ...	8.8.39
19,412	David William Montague Thomas	Weston Aero Club ...	8.8.39
19,413	Arthur John Tracy	London Air Park F.C. ...	8.8.39
19,414	Reginald Alfred Restall	London Air Park F.C. ...	8.8.39
19,415	Walter Douglas Ridgway ...	London Air Park F.C. ...	8.8.39
19,416	Mario Lucani	London Air Park F.C. ...	8.8.39
19,417	John Wilfred Patterson	Wiltshire Flying Club ...	8.8.39
19,418	John Slater Gamble	Coventry Aeroplane Club	8.8.39
19,419	William Stephen Akers	Coventry Aeroplane Club	8.8.39
19,420	Walter John Essex	Coventry Aeroplane Club	8.8.39
19,421	Frederick Robert Lamey ...	Brooklands Flying Club...	8.8.39
19,422	Hubert John Curtis	Witney and Oxford Ae. C.	8.8.39
19,423	Clifford George Turner	Doncaster Aero Club ...	8.8.39
19,424	Lewes Alan Likeman	Norfolk and Norwich Ae.C.	8.8.39
19,425	Alfred Hornby	Coventry Aeroplane Club	8.8.39
19,426	Robert Stewart Dorward ...	Edinburgh Flying Club ...	8.8.39
19,427	William Arthur Richardson ...	No. 43 E and R. F.T.S.	8.8.39
19,428	(Sir) Ian Stewart-Richardson (Bt.)	London Aeroplane Club...	8.8.39
19,429	Henry Louis Moody	Lincolnshire Aero Club ...	8.8.39
19,430	Louis Dinkenor	Southend Flying Club ...	8.8.39
19,431	Edward Kempton Gould ...	Southend Flying Club ...	8.8.39
19,432	Albert William Parfett	Southend Flying Club ...	8.8.39
19,433	Emil Pohorille	"Aviron" Palestine Aviation Co., Ltd., School	8.8.39
19,434	Alexander Tennille Burton ...	U.S. Transport Licence	9.8.39
19,435	Francesca Sarah Chinnery Bergin	Romford Flying Club ...	9.8.39
19,436	Norman Vivian Shannan ...	Romford Flying Club ...	9.8.39
19,437	Harold Trickey	Barnstaple and N. Devon	9.8.39
19,438	John Quinlan	Romford Flying Club ...	9.8.39
19,439	Raymond Lawrence Hayes ...	York and Leeming F.C....	9.8.39
19,440	William Ronald Omer James ...	Hampshire Aeroplane Club	9.8.39
19,441	Cyril Frederick Gifford	Yorkshire Aeroplane Club	9.8.39
19,442	Albert Henry Gater	Exeter Aero Club ...	9.8.39
19,443	Charles William Ian Parker ...	Isle of Wight Flying Club	9.8.39
19,444	Henry Lea Tudor	Ipswich Aero Club ...	9.8.39
19,445	John Linstead	Thanet Aero Club ...	9.8.39
19,446	Colin Morris Arthur Maclaverty...	Thanet Aero Club ...	9.8.39
19,447	Frank Edmond George Nugent ...	Ipswich Aero Club ...	9.8.39

THE INDUSTRY

FIRST FROM CHESTER : This perfectly normal Wellington is of special interest because it was assembled and delivered to the Service only eight months after work had been started on the building of the new Vickers-Armstrong works at Broughton, Chester.

Lighting and A.R.P.

BECAUSE so many modern factory layouts rely on large areas of roof lights for daylight illumination, the problem of complying with A.R.P. requirements is often a difficult one. The Civil Defence Bill (part VI) requires owners of factories to ensure that in the event of war no light is emitted at night from the windows or roof lights of their works. To comply with these regulations, which, incidentally, are not yet in force, the owner can take his choice from three alternative methods. Removable or hinged panels or blinds can be fitted. On the other hand, all glass can be painted black. Finally use can be made of a complementary colour system for lighting, employing a colour filter on the glass to obscure the internal illumination at night.

The first method is costly and in some large works difficult to operate. In the case of the second method the initial cost is low, but lighting costs will soar immediately, while the operatives will be required to work all day in artificial light. In the case of the third method it is possible to enable operatives to work by daylight by applying a specially prepared lacquer to the windows to serve as a filter when used in conjunction with monochromatic discharge lamps. Metropolitan-Vickers Electrical Co., Ltd., of 1, Kingsway, London, W.C.2, have developed this complementary colour system for use with the Metrovick Tablak lamp, which produces a highly efficient monochromatic light, having a light output several times that of a clear gasfilled lamp of equal wattage. At night the light emitted by this lamp is completely obscured by the Tablak lacquer filter when seen from outside, yet the maximum daylight is allowed to pass through the filter.

It will, of course, be appreciated that the filter is only effective when used with a Tablak lamp. Light from any other source, such as welding, will pass through the filter.

To Study U.S. Methods?

Mr. W. A. Weaver, managing director of the Coventry Victor Motor Co., Ltd., has left on an extended tour of the United States. He crossed over on the *Queen Mary* and will make his tour of the chief cities by air.

Instruments for Light Aircraft

FOR the manufacturer of light aircraft the choice of instruments is often restricted by costs. In consequence final selection is made from a minimum number of types, for there are very few instrument makers interested in the potential possibilities of the small aircraft market. In America, with rather specialised conditions prevailing, it is possible to obtain instruments having a high standard of accuracy produced at comparatively low costs owing to the modern production methods which it is possible to employ.

For many years the United States Gauge Company has been making a variety of precision instruments employing diaphragms and bourdon tubes for aircraft. Their range of instruments includes hydrostatic fuel gauges, bi-metal strut thermometers and an engine gauge unit incorporating thermometer, oil and pressure gauges in one case. Various types of pressure, fuel and suction gauges are also made by this company, but of particular interest are the air speed indicator and altimeter which are made for small aircraft.

The specification of the A.S.I. is an exacting one. For example, in the vibration test a margin of only 3 m.p.h. is permissible from 0 to 2,000 v.p.m. In the temperature test a tolerance of 4 m.p.h. is allowed, while in the leak tests the indicated drop must not exceed 2 m.p.h. in two minutes. This instrument, which is neatly finished in a black bakelite case, is graduated from 40 m.p.h. up to 120 m.p.h. and costs in this country £4 19s. 6d., duty paid.

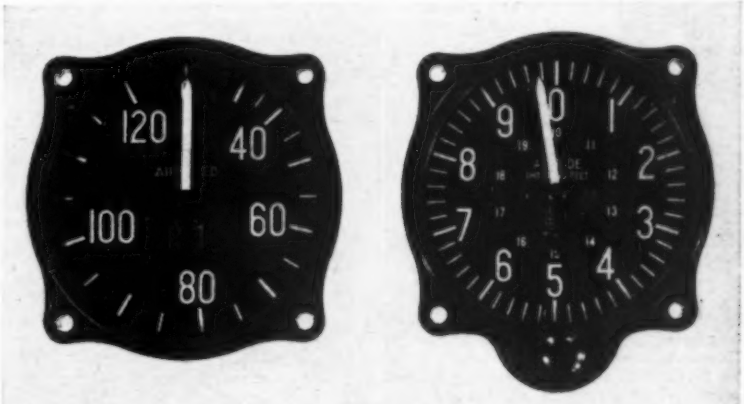
The altimeter is similar in appearance to the A.S.I., but it is fitted with a small knurled knob by which the scale can be set. Its price is £4 17s. 6d.

Further details of the full range of instruments made by the United States Gauge Co. are obtainable from Aviation Corporates, Ltd., 50, Pall Mall, London, S.W.1.

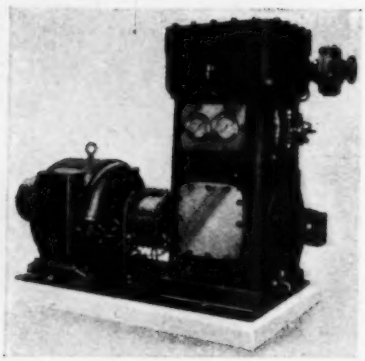
The Merlin Gudgeon Pin

IN a brief paragraph published in these columns on August 3, the wording might have given an erroneous impression to some readers that a certain type of gudgeon pin made by Hepworth and Grandage, Ltd., had, on account of its special features, been selected by Rolls-Royce, Ltd., for use in the Merlin.

Actually the standard Merlin gudgeon pin is made like any other R.R. product manufactured by sub-contractors, i.e., drawings, material and heat treatment specifications are supplied by Rolls-Royce, Ltd.



The neat instruments designed by the United States Gauge Company for light aircraft. On the left is the airspeed indicator while on the right is the altimeter which records up to 20,000 ft.



A new single-cylinder two-stage monobloc compressor made by J. Browett Lindley (1931) Ltd.

An Unusual Unicylinder Monobloc Compressor

SOME time ago J. Browett Lindley (1931), Ltd., of Letchworth, Herts, introduced a two-cylinder two-stage monobloc compressor which, on account of its compact construction and other features, attracted a considerable amount of interest.

Following the success of this machine the company has now developed a somewhat smaller compressor to meet the demand for outputs ranging from 150 cu. ft. per min. to 250 cu. ft. per min. at 80/150 lb. per sq. in.

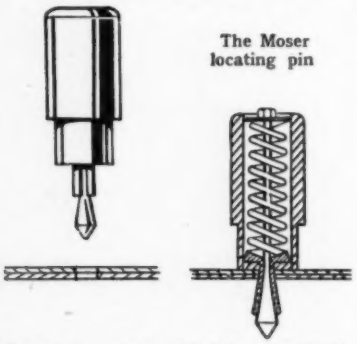
The unusual feature of the new compressor is that unlike other single-cylinder two-stage compressors the piston has one diameter only, the first stage compression taking place beneath the piston and the second stage above. The clearance volumes of the two stages are ranged so that the air from the first stage passes smoothly to the second stage without re-compression. The volumetric efficiency is as high with this construction as with the normal two-cylinder type. The overall volumetric efficiency depends only on the clearance space in the first stage which has been made as small as is practicably possible.

Advantage is taken of the unusually large clearance space of the second stage portion of the cylinder to incorporate a ribbed cooler inside the cylinder head to act as an auxiliary inter-cooler. Incidentally, a further cooling effect is obtained by the mixing of the air from the first stage with the cool air already present in the second stage clearance space.

All working parts of this compressor, including the flywheel, water-cooled finned-tube type main inter-cooler, air controlled automatic relay governor, etc., are contained in a box-shaped housing. The valves are of the automatic plate type, with a small lift. Chambers and covers are water-cooled. Large doors are provided at the front and rear for access to the crankcase. Valves, pistons, piston rods and connecting rods can be lifted out from the top without moving the cylinder block. A gear pump provides oil under pressure to all working parts except the cylinder, the lubrication of which, owing to the cross head construction, is entirely separate and is supplied by a sight feed mechanical lubricator. The oil supply is in this manner accurately controlled, giving clean air and preventing waste of oil and carbonisation of valves and control gear.

New Locating Pin for Riveting

TACKING bolts, pins and similar devices, used for securing sheets or other members during riveting, possess certain disadvantages. In existing types of locating pins a grip is obtained by a step on the central pin which reduces the effective diameter by half. When pins of this kind are used the "creeping" action inseparable from the process of riveting often causes them to become



The Moser locating pin

tightly jammed in the holes, frequently rendering them irremovable except by breakage.

To produce a more satisfactory method of securing two sheets together for riveting. Short Brothers, Ltd., designed and patented a special type of pin incorporating a split sleeve which is expanded into engagement with the sides of the hole when the spring loaded taper plunger is allowed to enter the sleeve. In this manner the two sheets are positively clamped together.

Instantaneous insertion and easy extraction are provided for by the use of a simple pistol-like tool into which the pin is inserted. Movement of the pistol trigger operates the spring loaded central plunger of the pin, allowing the split sleeve to be contracted for insertion or removal.

This new type of pin—it is known as the Moser locating-pin—is made in three sizes for $\frac{3}{32}$in., $\frac{1}{4}$in. and $\frac{5}{32}$in. rivets. The Moser pin is now being manufactured by Mosers, Ltd., 170-192, Borough High Street, London, and stocks are available at both this company's London and Liverpool warehouses.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

CUB AIRPORT, LTD.—Capital £2,500. To manage and conduct the Watchfield Flying Club, Wilts. Directors: A. J. Walter and G. Plaut. Registered office: Cub Airport, Watchfield, Swindon, Wilts.

RECORD MANUFACTURING CO. (LONDON), LTD.—Capital £2,500. Sheet metal workers and general craftsmen, aviation and general engineers. Directors: T. E. Nunn and Mrs. E. J. Nunn, of 62, Colchester Road, London, E.10.

C. F. AIRCRAFT, LTD.—Capital £100. To adopt an agreement with G. W. R. Fane and to develop inventions relating to aircraft. Solicitors: Mount Sterry and Co., 24, Martin Lane, Cannon Street, London, E.C.4.

M. W. P., LTD.—Capital £100. Wholesale and retail dealers in metals and minerals of all kinds, electro, chromium, nickel and metal platers. Directors: F. G. Miles, G. H. Miles, L. H Whatley and N. Parsons. Registered office: 6/8, Blagrave Street, Reading, Berks.

The late Mr. T. B. André

Death of a Well-known Personality

FLIGHT regrets to record the sudden death on Saturday, August 5, of Mr. Theodore Bernard André at his cottage at Bosham, Sussex.

Although Mr. André was best known in motor racing and yachting circles—he was actively interested in racing in both spheres—he was at the same time a leading figure in the aircraft industry through his various companies. In this connection he was well known as chairman and managing director of Silentbloc, Ltd., Andre (Components), Ltd., T. B. Andre and Co., Ltd., and the T. B. Andre Rubber Co., Ltd.

In Brief

It was announced last week-end that a new Tyneside company has been formed to manufacture metal and wood aircraft equipment, fuel tanks, etc. The name of the new company is North-Eastern Components, Ltd. The works are on the Team Valley Trading Estate, near Gateshead -on-Tyne.

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Well known as a member of the executive staff of the Vega Airplane Co., of Burbank, California, Mr. Sidney Fedan has recently resigned in order to take up a position with the Everel Propeller Corporation, of Baltimore, as vice-president in charge of sales. The Everel single-blade airscrew, it will be remembered, is handled in this country by W. S. Shackleton, Ltd.

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At the forthcoming engineering and marine exhibition at Olympia, Wild-Barfield Electric Furnaces, Ltd., and G.W.B. Electric Furnaces, Ltd., will be exhibiting on their stand a number of photographs and models of installation. In addition there will be samples of hardening shop compounds and quenching oils. Various kinds and types of furnaces will be demonstrated.

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In the same exhibition at Olympia there will be a wide range of bushes, anti-vibration mountings and flexible couplings on the stand of Silentbloc, Ltd. An interesting feature will be a new reciprocating type of pump in which the pistons are sealed by means of an oil-resisting rubber ring. In this pump there are no metal-to-metal parts in frictional contact. Even the valves are of rubber. This unit is suitable for a wide variety of duties, and is even capable of pumping liquids containing a considerable percentage of solids.